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MASSACHUSETTS

UNIT HEATERS TYPES "V" AND "C"



MASSACHUSETTS BLOWER DIVISION
of
THE BISHOP & BABCOCK SALES CO.
General Offices - 4901-4915 Hamilton Ave. N.E.
CLEVELAND, OHIO.

A. I. A. FILE No. 30 D11

heating ventilation

MASSACHUSETTS



Massachusetts Type V Unit Heater
For Floor Mounting



Massachusetts Type C Unit Heater
For Ceiling Suspension

The B&B Line

MASSACHUSETTS

The Bishop & Babcock Line of Massachusetts Unit Heaters

The development of the Unit Heater System of heating and ventilating has progressed to a point where an insistent demand is voiced for a revolutionary improvement in design, operation, appearance and efficiency of the Unit Heater.

In response to this demand, we present the New Massachusetts Modified Unit Heater in both floor and ceiling types in which are incorporated numerous improvements in design, efficiency and operation—the result of many experiments and tests. We believe it to be the most efficient line of Unit Heaters made.

Massachusetts Type V Unit Heater (Floor Type)

The design is in strict accordance with the fundamental laws of air circulation. The unit, drawing cool air from a point just above the floor level and discharging horizontally at high velocity just above the breathing or working zone, distributes the heated air in the breathing zone and not in the upper areas where it is wasted by causing a considerable increase in heat transmission through the roof and upper walls.

Heated air can be deflected downward by means of baffles, etc., but will rebound unless the cooler air at the lower levels is withdrawn. The air inlet of Massachusetts Type V Unit Heaters, being just above the floor level, removes the lower strata of cool air, and allows the warmer strata in the breathing zone to fall, thus insuring a uniform temperature.

The Bishop & Babcock line of Massachusetts Unit Heaters presents the latest, most efficient and economical means of heating and ventilating large areas such as manufacturing plants, factory offices, gymnasiums, prisons, commercial garages, etc., and in addition, applications are found in the industrial drying field.

Massachusetts Type C Unit Heater (Ceiling Type)

For installations where floor space is not available for placing of the units we recommend the Massachusetts Type C Unit Heater for ceiling suspension. This unit is similar in design, construction and performance to the Type V Units except that the air flows through the units in a horizontal plane. The Type C Unit is equipped with special discharge connections controlling the angle of air deflection downward, according to the requirements of the particular installation.

The overall efficiency of any ceiling mounted unit is less than that of a floor mounting due to the loss of aspirating or stack effect in the unit and slightly higher inlet temperatures prevailing in the upper areas. However, due to the extremely high outlet velocities induced by the Massachusetts Type C Unit Heater, these losses are reduced to a minimum.

The B&B Line

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Construction Details of Massachusetts Type V and C Modified Unit Heaters

Fans



Massachusetts Type V and C Unit Heaters are equipped with a series of double width double inlet Massachusetts Squirrel Cage Fans mounted on a common shaft, the number of fans depending on the size of the unit. These fans are designed to combine rigid construction and great strength with entrance to the blades free from obstruction. The blades and annular rings are formed in dies so that each is an exact duplicate of the others. This uniformity of thickness and weight gives the nice balance

necessary to prevent deflection, distortion or vibration at high speeds. Projections on the ends of each blade protrude through formed slots in the annular rings, and are rivetted over in special machines designed for this particular purpose. The three-arm spider of malleable iron is securely rivetted to the three extended main blades producing extreme rigidity.

After fabrication, each wheel is hot galvanized, which positively prevents rattling of the floats, and protects the entire wheel against rust and erosion.

Each wheel is given an accurate static balance, and, as a measure to insure absolute freedom from vibration, the entire fan assembly, on its own shaft is put into dynamic balance at its speed of operation.

Fan Casings

The special problem of producing a fan housing of efficient design, combined with necessary lightness of weight has been solved in this unit. The sides, including the low loss inlet cone and flanged stiffeners around the edges are each pressed from one piece of deep drawing steel. The scroll sheets are spot welded to the flanged casing sides.



Shaft, Bearings and Couplings

The shafts, of high carbon steel, ground and polished to exacting dimensions, are sized for negligible deflection, which provides ample safety in load transmission.



The B&B Line

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Whipping of the shaft, a common occurrence in unit heaters of this type, has been entirely eliminated by the use of three bearing supports on the larger sizes.



Fafnir Self-Aligning Pillow Block Ball Bearings fitted for Alemite lubrication, have been accepted as standard on all units. The end bearings are mounted on special cast iron brackets, which are provided with holes for crane hooks to facilitate handling of the top assembly and complete unit heater. The possibility of misalignment of the bearings has been precluded by floating the center bearing on a heat resistant rubber cushion and by providing a high-grade flexible coupling between the motor drive and the fan shaft.



Casings

Heavy steel plates forming the ends are spot welded to the side sheets to form a rigid, substantial heater casing. Grooves pressed into the side sheets and running the length of the casing, furnish stiffening for these sheets and support for the heater section.

Heater Section

High Pressure B & B special heating sections, designed for 200 lbs. per square inch steam working pressure, and tested at 250 lbs. hydrostatic pressure, is used exclusively. Tinned copper tubes and fins, the former rolled into cast iron headers, form a heater element of highest efficiency with boiler type construction.



A removable panel in the end sheet permits access to the heater section which may be slid out like a drawer, for cleaning or inspection.

The B&B Line

Cowls

A sheet metal discharge cowl of scientific and practical design is supplied for each outlet. The standard cowls may be turned in any one of four directions on the square fan outlets and will discharge the air in a plane just above the breathing zone. Cowls with special angles of discharge can be furnished when required.



Top Assembly

Fan housing, wheels, shaft, bearings and discharge cowls form a complete assembly on the rigid top sheet which fits like a lid on the heater casings. Removal of a few very accessible bolts will allow the entire top assembly to be lifted off by the bearing brackets, which are provided with holes for the crane hooks.



Motors

All units are powered by standard commercial ball-bearing motors of high-grade manufacture. The motor is mounted on live rubber cushions, secured to a substantial structural steel bracket by bolts through rubber bushings and washers, preventing motor noise and vibration being transmitted to the heater casing.

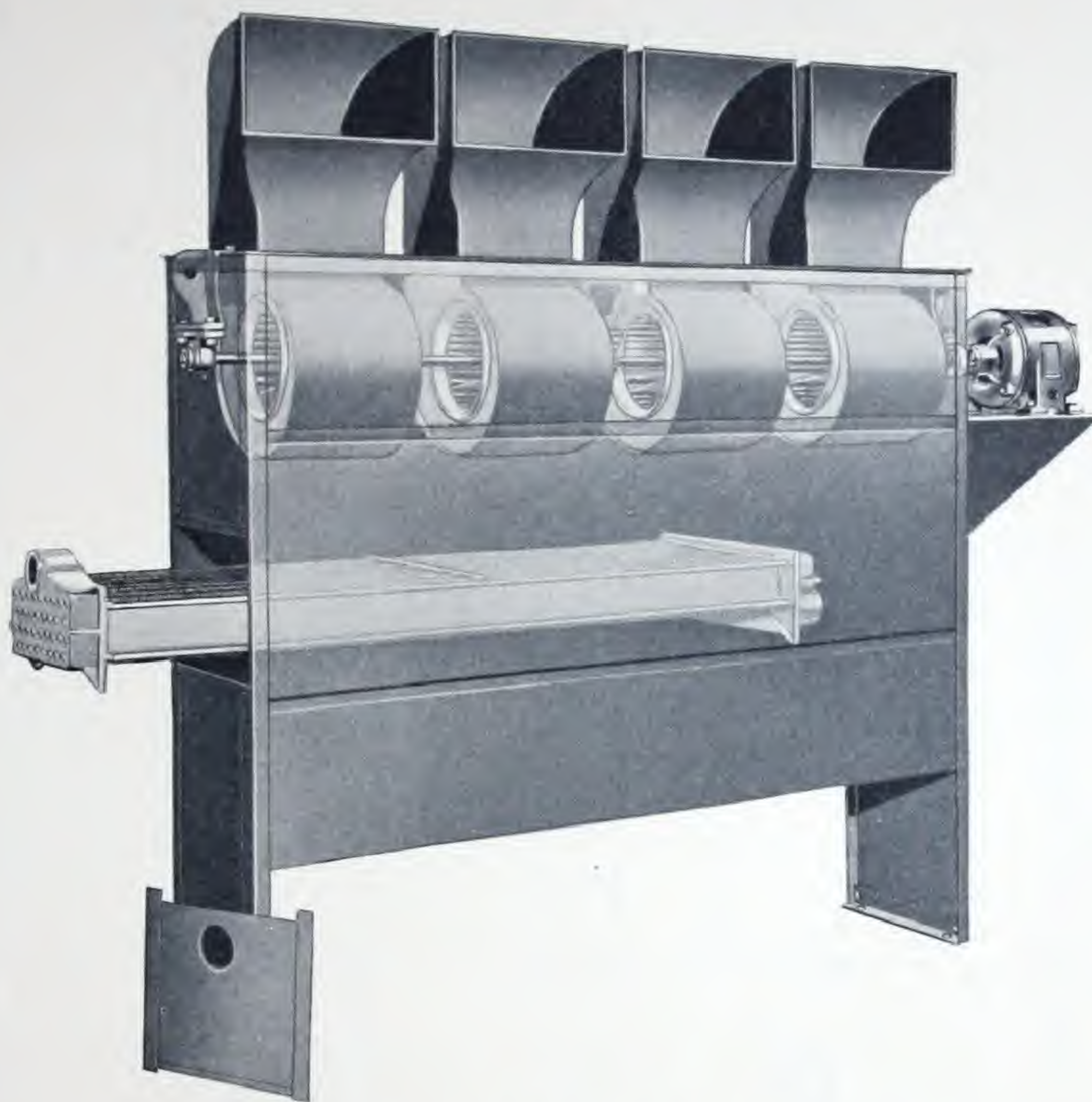
Mixing Dampers

When desired, manual or automatically operated mixing dampers, and fresh air wall boxes may be furnished for both the floor and the ceiling models. By the use of these dampers fresh air may be taken from the outside, the inside air may be recirculated, or a mixture of both may be had.

Units of Special Design

The method of constructing the type V and C Unit Heaters makes them readily adaptable to installations where a special design is desirable. The length and in some cases the shape of the casing may be changed to suit conditions, also the length and type of the discharge cowls. Filters may be installed in the units, and any type of drive may be used. In installations where a relatively large number of units are required, special designs can often be had at no increase in cost.

MASSACHUSETTS



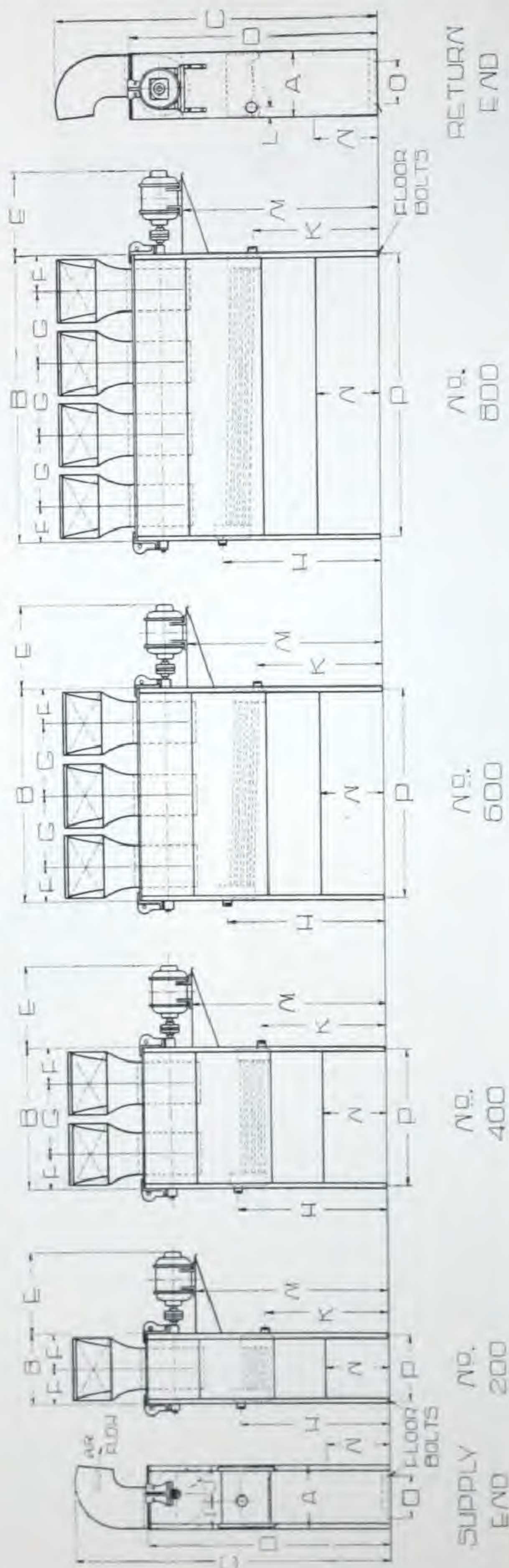
Massachusetts Type V Unit Heater

The labor involved in the installation of these units has been reduced to a minimum. Shipment is made with the cowls and heater section separate, which so lightens the unit that it may be handled by two men without the aid of a crane. It is a simple and easy operation to remove the panel in the end and slide the heater section into the casing. The cowls, which come packed in substantial cartons, to protect them from damage in transit and on the job, are readily slipped onto the fan outlets and secured.

Each unit is finished with two coats of high grade lacquer, in a shade of rich maroon which harmonizes with and enhances the appearance of its surroundings.

The B&B Line

Dimensions Massachusetts Type "V" Unit Heater 18-inch Model FOR FLOOR MOUNTING



Unit No.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Size of Tappings Steam	Drip	Floor Space Sq. Ft.	Size Outlet Cowl	Total Ship g Weight
200	18	32 1/2	90	69	18 7/8	16 1/4	22 1/4	42 1/2	7 1/8	10 3/8	35 1/8	2 1/2	54 7/8	18	14	29 1/2	2 1/2	2 1/2	4.00	10 3/8 x 18 1/2	775
400	18	44 1/2	90	69	21 1/8	11 1/8	22 1/4	42 1/2	7 1/8	10 3/8	35 1/8	2 1/2	54 7/8	18	14	41 1/2	2 1/2	2 1/2	5.56	10 3/8 x 18 1/2	930
600	18	68 1/2	90	69	21 1/8	11 3/8	22 3/4	44 3/8	7 1/8	10 1/8	35 1/8	2 1/2	54 7/8	18	14	65 1/2	2 1/2	2 1/2	8.50	10 3/8 x 18 1/2	1130
800	18	86 1/2	90	69	21 7/8	10 1/8	21 9/16	44 3/8	7 1/8	10 1/8	35 1/8	2 1/2	54 7/8	18	14	83 1/2	2 1/2	2 1/2	10.10	10 3/8 x 18 1/2	1230

Heating Sections:

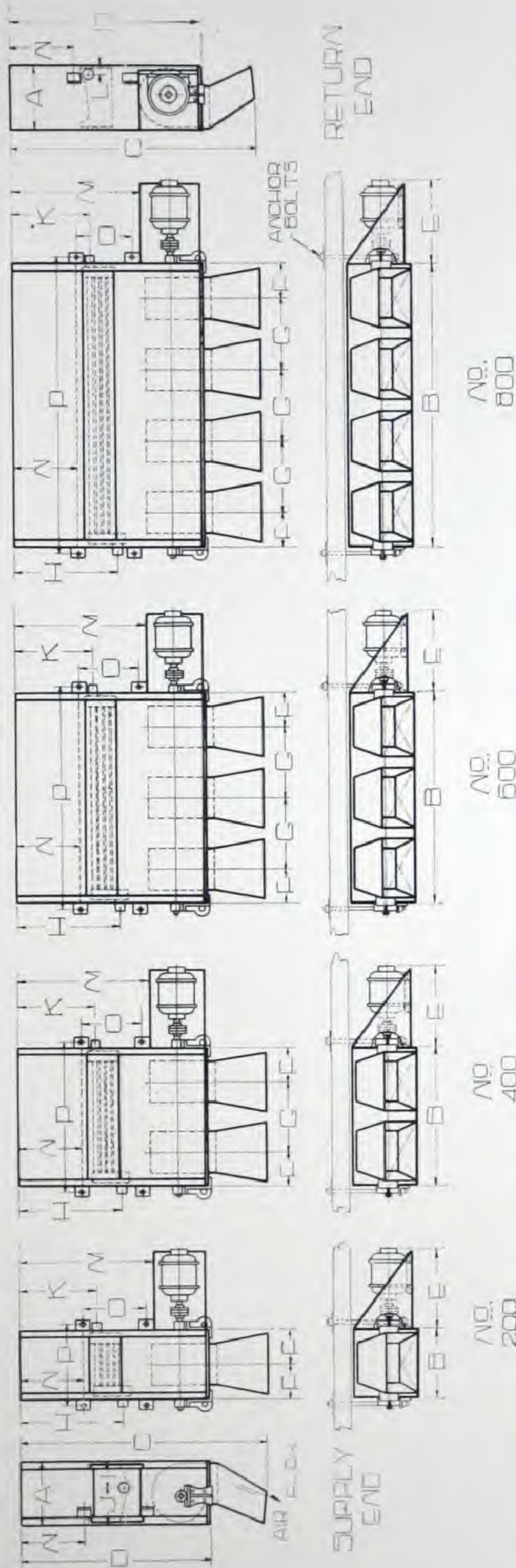
	3 Row	4 Row
No. 200	53 Lineal feet Tubing	71 Lineal feet Tubing
No. 400	78 Lineal feet Tubing	105 Lineal feet Tubing
No. 600	128 Lineal feet Tubing	173 Lineal feet Tubing
No. 800	165 Lineal feet Tubing	224 Lineal feet Tubing

Fan Wheels:

	No. 200	No. 400	No. 600	No. 800
1-10 1/2" diameter S. C. Fan				
2-10 1/2" diameter S. C. Fans				
3-10 1/2" diameter S. C. Fans				
4-10 1/2" diameter S. C. Fans				

Dimensions Massachusetts Type "C" Unit Heater 18-inch Model

FOR CEILING SUSPENSION



Unit No.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Size of Tappings		Ceiling Space Sq. Ft.	Size Outlet Cowl	Total Shipping Weight
																	Steam	Drip			
200	18	32 1/2	72	54	19 1/8	16 1/4	22 1/4	30	7 1/8	10 3/16	22 5/8	2 1/2	39	18	20	36	2 1/2	2 1/2	18.5	9x20	765
400	18	44 1/2	72	54	21 1/8	11 1/8	22 1/4	30	7 1/8	10 3/16	22 5/8	2 1/2	39	18	20	48	2 1/2	2 1/2	26.5	9x20	915
600	18	68 1/2	72	54	21 1/8	11 3/8	22 3/4	30	7 1/8	10 3/16	22 5/8	2 1/2	39	18	20	72	2 1/2	2 1/2	39.5	9x20	1100
800	18	86 1/2	72	54	21 7/8	10 1/8	21 1/8	30	7 1/8	10 3/16	22 5/8	2 1/2	39	18	20	90	2 1/2	2 1/2	44.5	9x20	1205

Heating Sections:

3 Row

No. 200
No. 400
No. 600
No. 800

4 Row

71 Lineal feet Tubing
105 Lineal feet Tubing
173 Lineal feet Tubing
224 Lineal feet Tubing

Fan Wheels:

No. 200 1-10 1/2" diameter S. C. Fan
No. 400 2-10 1/2" diameter S. C. Fans
No. 600 3-10 1/2" diameter S. C. Fans
No. 800 4-10 1/2" diameter S. C. Fans

No. 200 MASSACHUSETTS TYPES "V" and "C" UNIT HEATERS

FLOOR AND CEILING MODELS

Enter- ing Air Temp.	HEATER Number of tubes deep	C. F. M.	R. P. M.	H. P.	Final Temp. of F.	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. of F.	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. of F.	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.
70° F.	4 Rows	2090 1560 1290	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	0 lbs. Steam Pressure—212° F			505 405 365	10 lbs. Steam Pressure—240° F			585 475 425	75 lbs. Steam Pressure—320° F			795 645 575
					125.5	121250	125	125	135.5	141850	149	585	162	192210	215	795
					130	97970	101	405	141	114240	120	475	169	154660	173	645
					135.5	87300	90	365	147	101860	107	425	178	137680	154	575
	3 Rows	2100 1570 1295	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	5 lbs. Steam Pressure—227° F			410 335 300	25 lbs. Steam Pressure—267° F			480 390 350	125 lbs. Steam Pressure—353° F			650 530 470
					115	98940	102	410	123	115190	121	480	142.5	155560	174	650
					119	80510	83	335	128	93300	98	390	150	126950	142	530
					123	71780	74	300	132.5	83780	88	350	156.5	112640	126	470
	4 Rows	2090 1560 1290	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	10 lbs. Steam Pressure—240° F			670 535 475	75 lbs. Steam Pressure—320° F			865 695 620				
					131	132480	138	550	170	160480	172	670	170	207450	239	865
					136	106560	111	445	176.5	127820	137	535	176.5	166660	192	695
					141.5	95040	99	395	188.5	114760	123	475	188.5	149300	172	620
	3 Rows	2100 1570 1295	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	25 lbs. Steam Pressure—267° F			450 365 325	125 lbs. Steam Pressure—353° F			700 570 505				
					120	107520	112	450	149.5	130620	140	545	149.5	168390	194	700
					123	87360	91	365	157	105430	113	440	157	137140	158	570
					129	77760	81	325	164	94230	101	390	164	121520	140	505
60° F.	4 Rows	2090 1560 1290	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	0 lbs. Steam Pressure—212° F			550 445 390	10 lbs. Steam Pressure—240° F			635 510 450	75 lbs. Steam Pressure—320° F			845 680 600
					119.5	131920	136	550	129.5	152320	160	635	155.5	202940	227	845
					124.5	106700	110	445	135	122810	129	510	163.5	163600	183	680
					129.5	94090	97	390	141.5	108530	114	450	172	144830	162	600
	3 Rows	2100 1570 1295	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	25 lbs. Steam Pressure—267° F			450 365 325	125 lbs. Steam Pressure—353° F			690 560 500				
					108	107670	111	450	136	123760	130	515	136	165390	185	690
					112	87300	90	365	143.5	101860	107	425	143.5	134990	151	560
					116.5	77600	80	325	150.5	90440	95	375	150.5	119800	134	500
	4 Rows	2090 1560 1290	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	10 lbs. Steam Pressure—240° F			710 575 505	75 lbs. Steam Pressure—320° F			910 735 645				
					125	143040	149	595	164	170740	183	710	164	218740	252	910
					130	115200	120	480	173	138080	148	575	173	176200	203	735
					150.5	101760	106	425	181	121290	130	505	181	155370	179	645
	3 Rows	2100 1570 1295	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	25 lbs. Steam Pressure—267° F			580 475 420	125 lbs. Steam Pressure—353° F			740 605 540				
					112	116160	121	485	142.5	139020	149	580	142.5	177940	205	740
					117	95040	99	395	151	113820	122	475	151	145820	168	605
					121.5	84480	88	350	160	100760	108	420	160	129330	149	540
50° F.	4 Rows	2090 1560 1290	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	0 lbs. Steam Pressure—212° F			595 470 425	10 lbs. Steam Pressure—240° F			675 545 485	75 lbs. Steam Pressure—320° F			890 710 635
					113.5	142590	147	595	123.5	162790	171	675	149	213670	239	890
					118	113490	117	470	129	130420	137	545	157	170750	191	710
					123	101850	105	425	136	116140	122	485	167	152870	171	635
	3 Rows	2100 1570 1295	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	25 lbs. Steam Pressure—267° F			550 445 395	125 lbs. Steam Pressure—353° F			715 585 525				
					100.5	114460	118	475	129	131380	138	550	129	172540	193	715
					105	93120	96	390	135.5	106620	112	445	135.5	140360	157	585
					110	83420	86	345	144.5	95200	100	395	144.5	126050	141	525
	4 Rows	2090 1560 1290	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	10 lbs. Steam Pressure—240° F			640 510 455	75 lbs. Steam Pressure—320° F			955 765 680				
					119	153600	160	640	149	181940	195	760	158	229150	264	955
					124	122880	128	510	157	145550	156	605	166.5	183150	211	765
					130.5	109440	114	455	167	129690	139	540	177	163180	188	680
	3 Rows	2100 1570 1295	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	25 lbs. Steam Pressure—267° F			515 420 375	125 lbs. Steam Pressure—353° F			770 625 560				
					105	123840	129	515	135	146480	157	610	135	184880	213	770
					110	100800	105	420	143	119420	128	500	143	150160	173	625
					115.5	90240	94	375	151.5	106360	114	445	151.5	134540	155	560

No. 200 Massachusetts Types "V" and "C" Unit Heaters—Continued

Entering Air Temp.	HEATER Number of tubes deep	C. F. M.	R. P. M.	H. P.	Final Temp. of.	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. of.	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.
30°F.	4 Rows	2090 1560 1290	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	0 lbs. Steam Pressure—212°F			675 545 480	10 lbs. Steam Pressure—240°F			755 605 535
					100	161990	167	675	109	180880	190	755
					106	130950	135	545	115.5	145660	153	605
					112	115430	119	480	124	128520	135	535
	3 Rows	2100 1570 1295	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	5 lbs. Steam Pressure—227°F			550 450 395	25 lbs. Steam Pressure—267°F			610 505 445
					86.5	132890	137	550	93.5	147560	155	610
					91.5	107670	111	450	100	120900	127	505
					96.5	95060	98	395	105	106620	112	445
	4 Rows	2030 1560 1290	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	0 lbs. Steam Pressure—212°F			720 580 510	10 lbs. Steam Pressure—240°F			830 670 590
					105	172800	180	720	118	199660	214	830
					111.5	139200	145	580	126	161410	173	670
					118.5	122880	128	510	132	141820	152	590
	3 Rows	2100 1570 1295	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	5 lbs. Steam Pressure—227°F			480 425	25 lbs. Steam Pressure—267°F			675 555 490
					90.5	141120	147	480	101	163280	175	675
					96.5	115200	120	425	107.5	133420	143	555
					101	101760	106	425	113.5	117560	126	490
0°F.	4 Rows	2090 1560 1290	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	0 lbs. Steam Pressure—212°F			810 650 575	10 lbs. Steam Pressure—240°F			870 700 615
					80.5	194000	200	810	87.5	209440	220	870
					86.5	156170	161	650	95	168500	177	700
					93.5	137740	142	575	102	147560	155	615
	3 Rows	2100 1570 1295	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	5 lbs. Steam Pressure—227°F			655 535 470	25 lbs. Steam Pressure—267°F			705 575 510
					63	157140	162	655	69.5	169460	178	705
					70.5	128040	132	535	77.5	138040	145	575
					76	113490	117	470	83	122810	129	510
	4 Rows	2090 1560 1290	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	0 lbs. Steam Pressure—212°F			845 685 600	10 lbs. Steam Pressure—240°F			945 765 670
					85	203520	212	845	96.5	227650	244	945
					92.5	164160	171	685	105	183800	197	765
					99	144000	150	600	112.5	161410	173	670
	3 Rows	2100 1570 1295	● 1150 860 * 710	1 1/2 1 1/4 1 1/8	5 lbs. Steam Pressure—227°F			690 560 495	25 lbs. Steam Pressure—267°F			770 625 555
					67	165120	172	690	76	184730	198	770
					74	134400	140	560	84	150210	161	625
					81.5	119040	124	495	91	133420	143	555

1. C. F. M.—The cubic feet of air per minute ratings in the above tables represent the total quantity of air handled by the fans and delivered thru the nozzles at the final temperatures.

2. R. P. M.—Units running at a speed of 1150 and 860 revolutions per minute are powered by 60 cycle alternating current or direct current motors.
*Units running at a speed of 710 revolutions per minute are powered by 25 or 50 cycle alternating current or direct current motors.

The speeds shown represent the full load R. P. M. of commercial motors having the corresponding current characteristics as noted above. The standard motors are designed to operate on 110, 220, 440 or 550 volts, Direct Current or single phase, 2-phase, or 3 phase Alternating Current.

●The 1150 R. P. M. units should not be used on installations where practically silent operation is required.

3. STEAM PRESSURE—Final temperatures, B. T. U. per hour, condensa-

tion in pounds per hour, and equivalent square feet of cast iron direct radiation, are based on dry and saturated steam being supplied to the heating element inlet at the gauge pressures shown.

4. EQUIVALENT RADIATION—The equivalent square feet of direct cast iron column type radiation is based upon the heat emission of 240 B. T. U. per hour per square foot of direct radiation.

5. FINAL TEMPERATURE—The temperature of the air at the discharge for ordinary heating jobs, should be limited to the range between 75° and 160°F.

6. TRAPS—Unit heaters using copper fin heating elements, such as used in the above heaters, require high capacity continuous flow traps to take care of the heavy initial condensation and to provide the necessary continuous draining of the heater to prevent freezing of the tubes when the temperature of the entering air is below 32°F. The B. & B. No. 0 Blast trap is designed especially for this service, and its use on the above heaters is highly recommended.

No. 400 MASSACHUSETTS TYPES "V" and "C" UNIT HEATERS

FLOOR AND CEILING MODELS

Enter- ing Air Temp.	HEATER	C. F. M.	R. P. M.	H. P.	Final Temp. of.	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. of.	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.
70°F.	Number of tubes deep											
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	122.5 126.5 129.5	221740 179530 156240	229 185 161	925 750 650	132 137 140	259420 209920 182310	273 221 192	1080 875 760
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	111 115 118	175640 144050 127120	181 148 131	735 600 530	137 143 149	278040 227250 201150	311 254 225	1160 950 840
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	127 132.5 135.5	242400 195840 156240	253 204 178	1010 815 710	164 172 177.5	379750 306400 266910	438 353 308	1580 1280 1110
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	115 119.5 122.5	192000 157000 138720	200 164 145	800 655 580	142 150 156	300760 245000 217000	347 283 250	1255 1020 905
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	115.5 120.5 123.5	239110 194490 168780	247 201 174	995 810 705	149 157.5 162.5	368330 299940 259710	412 336 291	1535 1250 1080
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	104 107.5 110.5	191090 155200 136770	197 160 141	800 650 570	129.5 136 141	294580 239150 210540	330 268 236	1225 995 880
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	120.5 127 129	259200 211200 182880	270 220 191	1080 880 760	157 166.5 172	396680 322900 279500	457 372 322	1650 1345 1165
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	107.5 112 115.5	206880 168480 148320	216 176 160	860 705 620	135.5 143 148.5	316820 257800 226980	365 297 262	1320 1075 945
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	109 114.5 117.5	256570 208550 180910	265 215 187	1070 870 755	141.5 150.5 156	383980 311560 270440	430 349 303	1600 1300 1130
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	96.5 101 104	205640 167330 146960	212 173 152	860 700 615	122 129 133.5	307990 250320 219480	345 280 246	1285 1045 915
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	114 119.5 123	276480 224640 194880	288 234 203	1150 940 815	150 160 165.5	413170 335920 291220	476 387 336	1720 1400 1215
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	100.5 105 108.5	221760 180480 158400	231 188 165	925 755 660	128.5 135.5 141	331140 267520 236530	382 311 273	1380 1125 985
60°F.	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	109 114.5 117.5	256570 208550 180910	265 215 187	1070 870 755	141.5 150.5 156	383980 311560 270440	430 349 303	1600 1300 1130
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	96.5 101 104	205640 167330 146960	212 173 152	860 700 615	122 129 133.5	307990 250320 219480	345 280 246	1285 1045 915
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	114 119.5 123	276480 224640 194880	288 234 203	1150 940 815	150 160 165.5	413170 335920 291220	476 387 336	1720 1400 1215
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	100.5 105 108.5	221760 180480 158400	231 188 165	925 755 660	128.5 135.5 141	331140 267520 236530	382 311 273	1380 1125 985
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	115.5 120.5 123.5	239110 194490 168780	247 201 174	995 810 705	149 157.5 162.5	368330 299940 259710	412 336 291	1535 1250 1080
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	104 107.5 110.5	191090 155200 136770	197 160 141	800 650 570	129.5 136 141	294580 239150 210540	330 268 236	1225 995 880
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	120.5 127 129	259200 211200 182880	270 220 191	1080 880 760	157 166.5 172	396680 322900 279500	457 372 322	1650 1345 1165
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	107.5 112 115.5	206880 168480 148320	216 176 160	860 705 620	135.5 143 148.5	316820 257800 226980	365 297 262	1320 1075 945
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	109 114.5 117.5	256570 208550 180910	265 215 187	1070 870 755	141.5 150.5 156	383980 311560 270440	430 349 303	1600 1300 1130
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	96.5 101 104	205640 167330 146960	212 173 152	860 700 615	122 129 133.5	307990 250320 219480	345 280 246	1285 1045 915
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	114 119.5 123	276480 224640 194880	288 234 203	1150 940 815	150 160 165.5	413170 335920 291220	476 387 336	1720 1400 1215
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	100.5 105 108.5	221760 180480 158400	231 188 165	925 755 660	128.5 135.5 141	331140 267520 236530	382 311 273	1380 1125 985
50°F.	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	109 114.5 117.5	256570 208550 180910	265 215 187	1070 870 755	141.5 150.5 156	383980 311560 270440	430 349 303	1600 1300 1130
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	96.5 101 104	205640 167330 146960	212 173 152	860 700 615	122 129 133.5	307990 250320 219480	345 280 246	1285 1045 915
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	114 119.5 123	276480 224640 194880	288 234 203	1150 940 815	150 160 165.5	413170 335920 291220	476 387 336	1720 1400 1215
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	100.5 105 108.5	221760 180480 158400	231 188 165	925 755 660	128.5 135.5 141	331140 267520 236530	382 311 273	1380 1125 985
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	115.5 120.5 123.5	239110 194490 168780	247 201 174	995 810 705	149 157.5 162.5	368330 299940 259710	412 336 291	1535 1250 1080
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	104 107.5 110.5	191090 155200 136770	197 160 141	800 650 570	129.5 136 141	294580 239150 210540	330 268 236	1225 995 880
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	120.5 127 129	259200 211200 182880	270 220 191	1080 880 760	157 166.5 172	396680 322900 279500	457 372 322	1650 1345 1165
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	107.5 112 115.5	206880 168480 148320	216 176 160	860 705 620	135.5 143 148.5	316820 257800 226980	365 297 262	1320 1075 945
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	109 114.5 117.5	256570 208550 180910	265 215 187	1070 870 755	141.5 150.5 156	383980 311560 270440	430 349 303	1600 1300 1130
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	96.5 101 104	205640 167330 146960	212 173 152	860 700 615	122 129 133.5	307990 250320 219480	345 280 246	1285 1045 915
	4 Rows	4060 3050 2520	●1150 860 * 710	1 1/4 1 1/4 1 1/4	114 119.5 123	276480 224640 194880	288 234 203	1150 940 815	150 160 165.5	413170 335920 291220	476 387 336	1720 1400 1215
	3 Rows	4080 3060 2530	●1150 860 * 710	1 1/4 1 1/4 1 1/4	100.5 105 108.5	221760 180480 158400	231 188 165	925 755 660	128.5 135.5 141	331140 267520 236530	382 311 273	1380 1125 985

No. 400 Massachusetts Types "V" and "C" Unit Heaters—Continued

Enter- ing Air Temp.	HEATER Number of tubes deep	C. F. M.	R. P. M.	H. P.	Final Temp. of,	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. of,	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.
30°F.					0 lbs. Steam Pressure—212°F							
	4 Rows	4060 3050 2520	● 1150 860 * 710	1 1/2 1/4	95 101 104.5	291970 238140 206000	301 246 213	1215 995 860	103.5 110 114	326600 266560 229430	343 280 241	1360 1110 905
	3 Rows	4080 3060 2530	● 1150 860 * 710	1 1/2 1/4	81.5 86.5 89.5	235230 191580 167330	243 198 173	980 800 700	88 93.5 97	262750 214200 186590	276 225 196	1095 895 780
					5 lbs. Steam Pressure—227°F							
	4 Rows	4060 3050 2520	● 1150 860 * 710	1 1/2 1/4	100 106 110	312000 254400 219360	325 265 229	1300 1060 915	112.5 120.5 124.5	362940 296230 255640	389 318 274	1510 1235 1065
	3 Rows	4080 3060 2530	● 1150 860 * 710	1 1/2 1/4	85.5 90.5 92.5	251520 204480 178560	262 213 186	1050 855 745	95 101 105.5	292500 237920 207590	314 255 223	1220 995 865
					10 lbs. Steam Pressure—240°F							
	4 Rows	4060 3050 2520	● 1150 860 * 710	1 1/2 1/4	74 81 84	346780 282760 244930	358 292 253	1445 1180 1020	80.5 88.5 92.5	373660 304640 263700	393 320 277	1555 1270 1100
	3 Rows	4080 3060 2530	● 1150 860 * 710	1 1/2 1/4	59 63 67.5	281300 228440 198850	290 236 205	1170 955 830	63.5 70.5 74	302740 246090 214200	318 259 225	1260 1025 895
					5 lbs. Steam Pressure—227°F							
	4 Rows	4060 3050 2520	● 1150 860 * 710	1 1/2 1/4	77.5 86 90	363840 296640 256800	379 309 268	1515 1235 1070	88 97 102	405860 331220 286900	435 355 308	1690 1380 1195
	3 Rows	4080 3060 2530	● 1150 860 * 710	1 1/2 1/4	63 67 72	295200 240000 208800	308 250 218	1230 1000 870	70 77 81	329350 268240 233250	353 288 250	1370 1120 975

1. C. F. M.—The cubic feet of air per minute ratings in the above tables represent the total quantity of air handled by the fans and delivered thru the nozzles at the final temperatures.
2. R. P. M.—Units running at a speed of 1150 and 860 revolutions per minute are powered by 60 cycle alternating current or direct current motors.
*Units running at a speed of 710 revolutions per minute are powered by 25 or 50 cycle alternating current or direct current motors.
The speeds shown represent the full load R. P. M. of commercial motors having the corresponding current characteristics as noted above. The standard motors are designed to operate on 110, 220, 440 or 550 volts, Direct Current or single phase, 2-phase, or 3 phase Alternating Current.
●The 1150 R. P. M. units should not be used on installations where practically silent operation is required.
3. STEAM PRESSURE—Final temperatures, B. T. U. per hour, condensation in pounds per hour, and equivalent square feet of cast iron direct radiation, are based on dry and saturated steam being supplied to the heating element inlet at the gauge pressures shown.
4. EQUIVALENT RADIATION—The equivalent square feet of direct cast iron column type radiation is based upon the heat emission of 240 B. T. U. per hour per square foot of direct radiation.
5. FINAL TEMPERATURE—The temperature of the air at the discharge for ordinary heating jobs, should be limited to the range between 75° and 160°F.
6. TRAPS—Unit heaters using copper fin heating elements, such as used in the above heaters, require high capacity continuous flow traps to take care of the heavy initial condensation and to provide the necessary continuous draining of the heater to prevent freezing of the tubes when the temperature of the entering air is below 32°F. The B. & B. No. 0 Blast trap is designed especially for this service, and its use on the above heaters is highly recommended.

No. 600 MASSACHUSETTS TYPES "V" and "C" UNIT HEATERS

FLOOR AND CEILING MODELS

Enter- ing Air Temp.	HEATER Number of tubes deep	C. F. M.	R. P. M.	H. P.	0 lbs. Steam Pressure—212°F			10 lbs. Steam Pressure—240°F			75 lbs. Steam Pressure—320°F		
					Final Temp. of,	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. of,	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. of,
70°F.	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	122 126.5 129.5	332600 269290 234350	343 278 242	1385 1125 975	132 137 140	389130 314870 273460	409 301 287	1620 1310 1140	156 163.5 168.5
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	111 115 118	263450 216080 190680	272 223 197	1100 900 795	118.5 123 127	308450 252080 225000	324 265 236	1285 1050 940	137 143 149
	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	127 132.5 135.5	363600 293760 255600	379 306 266	1515 1225 1065	141 146.5 150.5	440840 356170 309290	473 382 332	1835 1480 1290	164 172 177.5
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	115 119.5 122.5	288000 235500 208080	300 245 217	1200 985 865	125 130.5 134.5	349180 285750 251910	374 305 270	1450 1195 1050	143 150 156
	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	115.5 120.5 123.5	358660 291730 253170	370 301 261	1495 1215 1055	125 131 134	415550 239150 294170	435 355 308	1725 1405 1230	149 157.5 162.5
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	104 107.5 110.5	286640 232800 205160	300 240 212	1195 970 855	111 115.5 119.5	332010 270600 238470	347 283 249	1380 1120 985	129.5 136 141
	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	120.5 127 129	388800 316800 274320	405 330 286	1620 1320 1140	133.5 140 144.5	466760 379990 329610	499 406 352	1940 1575 1370	157 166.5 172
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	107.5 112 115.5	310320 252720 224480	323 263 232	1290 1055 925	117 123.5 127	372990 303020 267330	398 323 285	1550 1255 1105	135.5 143 148.5
	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	109 114.5 117.5	384850 312830 271360	397 323 280	1605 1305 1130	118 124.5 128	439110 357000 309880	461 375 326	1830 1490 1290	141.5 150.5 156
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	96.5 101 104	308460 250990 220430	318 259 227	1285 1045 920	103.5 108.5 112	352000 286310 251330	370 301 264	1465 1195 1045	122 129 133.5
	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	114 119.5 123	414720 336960 292320	432 351 305	1725 1405 1220	127 134 138	491230 398860 346380	527 428 371	2050 1660 1445	150 160 165.5
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	100.5 105 108.5	332640 270720 237600	347 282 248	1385 1130 990	110.5 116 120	393960 320480 281300	422 344 302	1645 1335 1170	128.5 135.5 141
60°F.	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	115.5 120.5 123.5	358660 291730 253170	370 301 261	1495 1215 1055	125 131 134	415550 239150 294170	435 355 308	1725 1405 1230	149 157.5 162.5
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	104 107.5 110.5	286640 232800 205160	300 240 212	1195 970 855	111 115.5 119.5	332010 270600 238470	347 283 249	1380 1120 985	129.5 136 141
	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	120.5 127 129	388800 316800 274320	405 330 286	1620 1320 1140	133.5 140 144.5	466760 379990 329610	499 406 352	1940 1575 1370	157 166.5 172
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	107.5 112 115.5	310320 252720 224480	323 263 232	1290 1055 925	117 123.5 127	372990 303020 267330	398 323 285	1550 1255 1105	135.5 143 148.5
	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	109 114.5 117.5	384850 312830 271360	397 323 280	1605 1305 1130	118 124.5 128	439110 357000 309880	461 375 326	1830 1490 1290	141.5 150.5 156
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	96.5 101 104	308460 250990 220430	318 259 227	1285 1045 920	103.5 108.5 112	352000 286310 251330	370 301 264	1465 1195 1045	122 129 133.5
	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	114 119.5 123	414720 336960 292320	432 351 305	1725 1405 1220	127 134 138	491230 398860 346380	527 428 371	2050 1660 1445	150 160 165.5
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	100.5 105 108.5	332640 270720 237600	347 282 248	1385 1130 990	110.5 116 120	393960 320480 281300	422 344 302	1645 1335 1170	128.5 135.5 141
	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	115.5 120.5 123.5	358660 291730 253170	370 301 261	1495 1215 1055	125 131 134	415550 239150 294170	435 355 308	1725 1405 1230	149 157.5 162.5
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	104 107.5 110.5	286640 232800 205160	300 240 212	1195 970 855	111 115.5 119.5	332010 270600 238470	347 283 249	1380 1120 985	129.5 136 141
	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	120.5 127 129	388800 316800 274320	405 330 286	1620 1320 1140	133.5 140 144.5	466760 379990 329610	499 406 352	1940 1575 1370	157 166.5 172
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	107.5 112 115.5	310320 252720 224480	323 263 232	1290 1055 925	117 123.5 127	372990 303020 267330	398 323 285	1550 1255 1105	135.5 143 148.5
50°F.	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	109 114.5 117.5	384850 312830 271360	397 323 280	1605 1305 1130	118 124.5 128	439110 357000 309880	461 375 326	1830 1490 1290	141.5 150.5 156
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	96.5 101 104	308460 250990 220430	318 259 227	1285 1045 920	103.5 108.5 112	352000 286310 251330	370 301 264	1465 1195 1045	122 129 133.5
	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	114 119.5 123	414720 336960 292320	432 351 305	1725 1405 1220	127 134 138	491230 398860 346380	527 428 371	2050 1660 1445	150 160 165.5
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	100.5 105 108.5	332640 270720 237600	347 282 248	1385 1130 990	110.5 116 120	393960 320480 281300	422 344 302	1645 1335 1170	128.5 135.5 141
	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	115.5 120.5 123.5	358660 291730 253170	370 301 261	1495 1215 1055	125 131 134	415550 239150 294170	435 355 308	1725 1405 1230	149 157.5 162.5
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	104 107.5 110.5	286640 232800 205160	300 240 212	1195 970 855	111 115.5 119.5	332010 270600 238470	347 283 249	1380 1120 985	129.5 136 141
	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	120.5 127 129	388800 316800 274320	405 330 286	1620 1320 1140	133.5 140 144.5	466760 379990 329610	499 406 352	1940 1575 1370	157 166.5 172
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	107.5 112 115.5	310320 252720 224480	323 263 232	1290 1055 925	117 123.5 127	372990 303020 267330	398 323 285	1550 1255 1105	135.5 143 148.5
	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	109 114.5 117.5	384850 312830 271360	397 323 280	1605 1305 1130	118 124.5 128	439110 357000 309880	461 375 326	1830 1490 1290	141.5 150.5 156
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	96.5 101 104	308460 250990 220430	318 259 227	1285 1045 920	103.5 108.5 112	352000 286310 251330	370 301 264	1465 1195 1045	122 129 133.5
	4 Rows	6090 4575 3780	●1150 860 * 710	1 1/2 3/4 1/2	114 119.5 123	414720 336960 292320	432 351 305	1725 1405 1220	127 134 138	491230 398860 346380	527 428 371	2050 1660 1445	150 160 165.5
	3 Rows	6120 4590 3795	●1150 860 * 710	1 1/2 3/4 1/2	100.5 105 108.5	332640 270720 237600	347 282 248	1385 1130 990	110.5 116 120	393960 320480 281300	422 344 302	1645 1335 1170	128.5 135.5 141

No. 600 Massachusetts Types "V" and "C" Unit Heaters—Continued

Enter- ing Air Temp.	HEATER	C. F. M.	R. P. M.	H. P.	Final Temp. °F.	B. T. U. per hour	Conden- sation lbs.perhour	Equiv. Rad. sq. ft.	Final Temp. °F.	B. T. U. per hour	Conden- sation lbs.perhour	Equiv. Rad. sq. ft.
30°F.	Number of tubes deep											
	4 Rows	6090 4575 3780	● 1150 860 * 710	1 1/2 3/4 1/2	95 101 104.5	437960 357200 309000	452 368 319	1825 1490 1290	103.5 110.5 114	489090 399840 344150	514 420 362	2040 1665 1435
	3 Rows	6120 4590 3795	● 1150 860 * 710	1 1/2 3/4 1/2	81.5 86.5 89.5	352840 287360 250990	364 296 259	1470 1195 1045	88 93.5 97	394130 321300 279890	414 338 294	1645 1340 1165
		0 lbs. Steam Pressure—212°F										
	4 Rows	6090 4575 3780	● 1150 860 * 710	1 1/2 3/4 1/2	100 106 110	468000 381600 329040	488 398 343	1950 1590 1370	112.5 120.5 124.5	544400 444350 383460	584 476 411	2265 1855 1600
	3 Rows	6120 4590 3795	● 1150 860 * 710	1 1/2 3/4 1/2	85.5 90.5 92.5	377280 306720 207840	393 320 279	1570 1280 1140	95 101 105.5	438740 356870 311390	470 383 334	1830 1490 1300
		5 lbs. Steam Pressure—227°F										
	4 Rows	6090 4575 3780	● 1150 860 * 710	1 1/2 3/4 1/2	74 81 84	520160 424130 367380	536 437 379	2170 1770 1530	80.5 88.5 92.5	560190 456960 395550	589 480 416	2335 1900 1650
	3 Rows	6120 4590 3795	● 1150 860 * 710	1 1/2 3/4 1/2	59 63 67.5	421950 342650 298280	435 353 308	1755 1430 1240	63.5 70.5 74	454100 369140 321300	477 388 338	1890 1540 1340
		10 lbs. Steam Pressure—240°F										
	4 Rows	6090 4575 3780	● 1150 860 * 710	1 1/2 3/4 1/2	77.5 86 90	545760 593280 385200	569 464 401	2275 1855 1605	88 97 102	608780 496820 430350	653 533 461	2535 2070 1795
	3 Rows	6120 4590 3795	● 1150 860 * 710	1 1/2 3/4 1/2	63 67 72	442800 360000 313200	461 375 326	1845 1500 1305	70 77 81	494030 402360 349880	530 431 375	2055 1675 1460
0°F.		25 lbs. Steam Pressure—267°F										
	4 Rows	6090 4575 3780	● 1150 860 * 710	1 1/2 3/4 1/2	107.5 118 125.5	717410 585900 513640	827 675 592	2985 2440 2140	107.5 118 125.5	717410 585900 513640	827 675 592	2985 2440 2140
	3 Rows	6120 4590 3795	● 1150 860 * 710	1 1/2 3/4 1/2	85.5 93 97.5	582650 473930 412080	671 546 475	2430 1975 1715	85.5 93 97.5	582650 473930 412080	671 546 475	2430 1975 1715
		75 lbs. Steam Pressure—320°F										
	4 Rows	6090 4575 3780	● 1150 860 * 710	1 1/2 3/4 1/2	102 111.5 117.5	686600 559190 484770	768 626 542	2860 2330 2020	102 111.5 117.5	686600 559190 484770	768 626 542	2860 2330 2020
	3 Rows	6120 4590 3795	● 1150 860 * 710	1 1/2 3/4 1/2	81.5 88 92.5	556500 452590 392910	623 506 440	2320 1885 1635	81.5 88 92.5	556500 452590 392910	623 506 440	2320 1885 1635
		125 lbs. Steam Pressure—353°F										
	4 Rows	6090 4575 3780	● 1150 860 * 710	1 1/2 3/4 1/2	107.5 118 125.5	717410 585900 513640	827 675 592	2985 2440 2140	107.5 118 125.5	717410 585900 513640	827 675 592	2985 2440 2140
	3 Rows	6120 4590 3795	● 1150 860 * 710	1 1/2 3/4 1/2	85.5 93 97.5	582650 473930 412080	671 546 475	2430 1975 1715	85.5 93 97.5	582650 473930 412080	671 546 475	2430 1975 1715

1. C. F. M.—The cubic feet of air per minute ratings in the above tables represent the total quantity of air handled by the fans and delivered thru the nozzles at the final temperatures.

2. R. P. M.—Units running at a speed of 1150 and 860 revolutions per minute are powered by 60 cycle alternating current or direct current motors.
*Units running at a speed of 710 revolutions per minute are powered by 25 or 50 cycle alternating current or direct current motors.

The speeds shown represent the full load R. P. M. of commercial motors having the corresponding current characteristics as noted above. The standard motors are designed to operate on 110, 220, 440 or 550 volts, Direct Current or single phase, 2 phase, or 3 phase Alternating Current.

●The 1150 R. P. M. units should not be used on installations where practically silent operation is required.

3. STEAM PRESSURE—Final temperatures, B. T. U. per hour, condensa-

tion in pounds per hour, and equivalent square feet of cast iron direct radiation, are based on dry and saturated steam being supplied to the heating element inlet at the gauge pressures shown.

4. EQUIVALENT RADIATION—The equivalent square feet of direct cast iron column type radiation is based upon the heat emission of 240 B. T. U. per hour per square foot of direct radiation.

5. FINAL TEMPERATURE—The temperature of the air at the discharge for ordinary heating jobs, should be limited to the range between 75° and 160°F.

6. TRAPS—Unit heaters using copper fin heating elements, such as used in the above heaters, require high capacity continuous flow traps to take care of the heavy initial condensation and to provide the necessary continuous draining of the heater to prevent freezing of the tubes when the temperature of the entering air is below 32°F. The B. & B. No. 0 Blast trap is designed especially for this service, and its use on the above heaters is highly recommended.

No. 800 MASSACHUSETTS TYPES "V" and "C" UNIT HEATERS

FLOOR AND CEILING MODELS

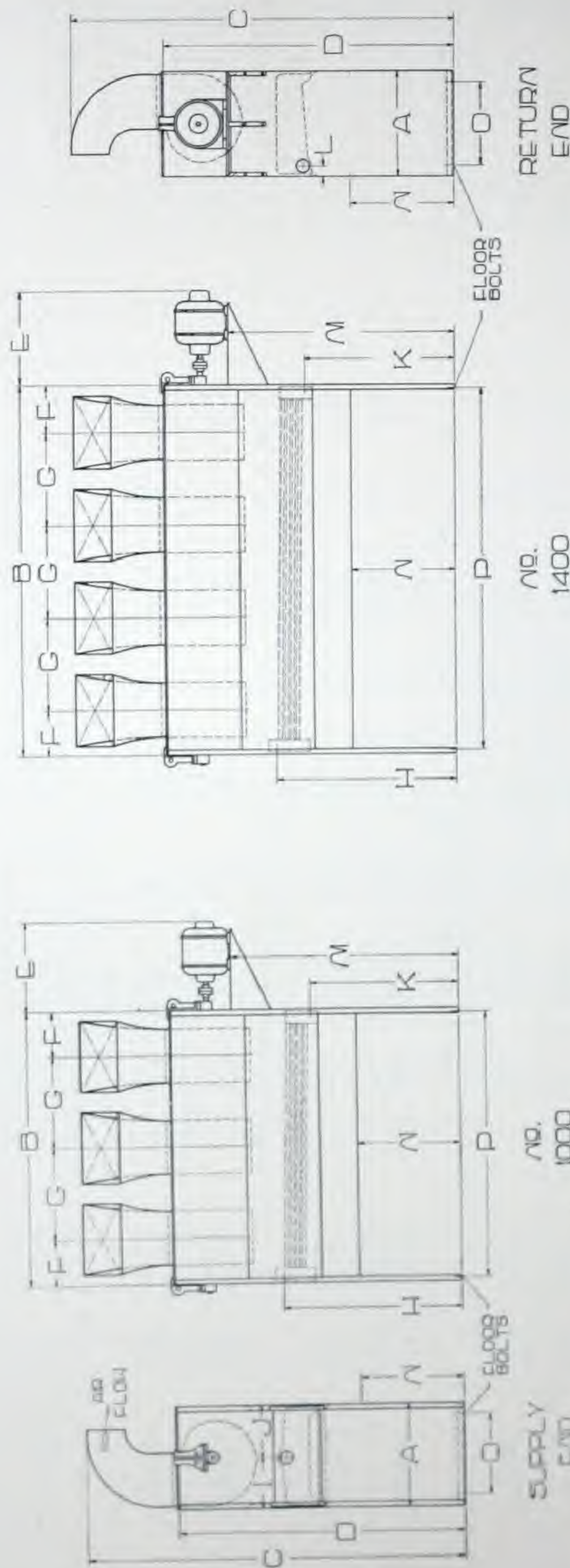
Enter- ing Air Temp.	HEATER Number of tubes deep	C. F. M.	R. P. M.	H. P.	0 lbs. Steam Pressure—212°F			10 lbs. Steam Pressure—240°F			75 lbs. Steam Pressure—320°F					
					Final Temp. of,	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. of,	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. of,	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.
70°F.	4 Rows	8120 6100 5040	● 1150 860 * 710	2 1 ½	122 126.5 129.5	443470 359050 312470	457 370 322	1845 1500 1300	132 137 140	518840 419830 364610	545 441 383	2160 1745 1520	156 163.5 168.5	701790 507690 493490	785 635 552	2925 2645 2055
	3 Rows	8160 6120 5060	● 1150 860 * 710	2 1 ½	111 115 118	451280 288100 254240	462 297 262	1465 1200 1060	118.5 123 127	411260 436100 300000	432 353 314	1715 1400 1250	137 143 149	556070 454500 402300	622 508 450	2320 1895 1675
	4 Rows	8120 6100 5040	● 1150 860 * 710	2 1 ½	127 132.5 135.5	484800 391680 340800	505 408 355	2020 1630 1420	141 146.5 150.5	587790 474890 412390	630 509 442	2445 1975 1720	164 172 177.5	759500 612800 533820	875 706 615	3160 2555 2220
	3 Rows	8160 6120 5060	● 1150 860 * 710	2 1 ½	115 119.5 122.5	384000 314000 277440	400 327 289	1600 1310 1155	125 130.5 134.5	465570 381000 335880	499 407 360	1935 1590 1400	143 150 156	601520 490000 434000	693 565 500	2505 2040 1805
	4 Rows	8120 6100 5040	● 1150 860 * 710	2 1 ½	115.5 120.5 123.5	478210 388970 337560	493 401 348	1990 1620 1405	125 131 134	552160 450300 390320	580 473 410	2300 1875 1625	149 157.5 162.5	736660 599870 519410	824 671 581	3070 2500 2160
	3 Rows	8160 6120 5060	● 1150 860 * 710	2 1 ½	104 107.5 110.5	382180 310400 273540	394 320 282	1595 1295 1140	111 115.5 119.5	440780 358900 316060	463 377 332	1840 1495 1315	129.5 136 141	589150 478290 421070	659 535 471	2450 1990 1755
60°F.	4 Rows	8120 6100 5040	● 1150 860 * 710	2 1 ½	120.5 127 129	518400 422400 365760	540 440 381	2160 1760 1520	133.5 140 144.5	620450 504750 437580	665 541 469	2585 2100 1825	157 166.5 172	793350 645790 558990	914 744 644	3300 2690 2325
	3 Rows	8160 6120 5060	● 1150 860 * 710	2 1 ½	107.5 112 115.5	413760 336960 296640	431 351 309	1720 1405 1235	117 123.5 127	495420 402120 354540	531 431 380	2065 1675 1475	135.5 143 148.5	633640 515590 453960	730 594 523	2640 2150 1890
	4 Rows	8120 6100 5040	● 1150 860 * 710	2 1 ½	109 114.5 117.5	513140 417100 361810	529 430 373	2140 1740 1505	118 124.5 128	585480 476000 413170	615 500 434	2440 1985 1720	141.5 150.5 156	767950 623120 540870	859 697 605	3200 2595 2255
	3 Rows	8160 6120 5060	● 1150 860 * 710	2 1 ½	96.5 101 104	411280 334650 293910	424 345 303	1715 1395 1225	103.5 108.5 112	469340 381750 335100	493 401 352	1955 1590 1395	122 129 133.5	615970 500640 438950	689 560 491	2565 2085 1830
	4 Rows	8120 6100 5040	● 1150 860 * 710	2 1 ½	114 119.5 123	552960 449280 389760	576 468 406	2300 1870 1625	127 134 148	654970 531810 461840	702 570 495	2730 2215 1925	150 160 165.5	826340 671830 582430	952 774 671	3440 2900 2425
	3 Rows	8160 6120 5060	● 1150 860 * 710	2 1 ½	100.5 105 108.5	443520 360960 316800	462 376 330	1845 1505 1320	110.5 116 120	525280 427310 375070	563 458 402	2190 1780 1560	128.5 135.5 141	662280 539030 473060	763 621 545	2760 2245 1970
50°F.	4 Rows	8120 6100 5040	● 1150 860 * 710	2 1 ½	115.5 120.5 123.5	478210 388970 337560	493 401 348	1990 1620 1405	125 131 134	552160 450300 390320	580 473 410	2300 1875 1625	149 157.5 162.5	736660 599870 519410	824 671 581	3070 2500 2160
	3 Rows	8160 6120 5060	● 1150 860 * 710	2 1 ½	104 107.5 110.5	382180 310400 273540	394 320 282	1595 1295 1140	111 115.5 119.5	440780 358900 316060	463 377 332	1840 1495 1315	129.5 136 141	589150 478290 421070	659 535 471	2450 1990 1755
	4 Rows	8120 6100 5040	● 1150 860 * 710	2 1 ½	120.5 127 129	518400 422400 365760	540 440 381	2160 1760 1520	133.5 140 144.5	620450 504750 437580	665 541 469	2585 2100 1825	157 166.5 172	793350 645790 558990	914 744 644	3300 2690 2325
	3 Rows	8160 6120 5060	● 1150 860 * 710	2 1 ½	107.5 112 115.5	413760 336960 296640	431 351 309	1720 1405 1235	117 123.5 127	495420 402120 354540	531 431 380	2065 1675 1475	135.5 143 148.5	633640 515590 453960	730 594 523	2640 2150 1890
	4 Rows	8120 6100 5040	● 1150 860 * 710	2 1 ½	109 114.5 117.5	513140 417100 361810	529 430 373	2140 1740 1505	118 124.5 128	585480 476000 413170	615 500 434	2440 1985 1720	141.5 150.5 156	767950 623120 540870	859 697 605	3200 2595 2255
	3 Rows	8160 6120 5060	● 1150 860 * 710	2 1 ½	96.5 101 104	411280 334650 293910	424 345 303	1715 1395 1225	103.5 108.5 112	469340 381750 335100	493 401 352	1955 1590 1395	122 129 133.5	615970 500640 438950	689 560 491	2565 2085 1830

No. 800 Massachusetts Types "V" and "C" Unit Heaters—Continued

Entering Air Temp.	HEATER Number of tubes deep	C. F. M.	R. P. M.	H. P.	Final Temp. of F.	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. of F.	B. T. U. per hour	Condensation lbs. per hour	Equiv. Rad. sq. ft.
30° F.	4 Rows	8120 6100 5040	● 1150 860 * 710	2 1 ½	0 lbs. Steam Pressure—212°F			2430 1985 1720	10 lbs. Steam Pressure—240°F			2720 2220 1910
					95	583940	602	2430	103.5	652120	685	2720
					101	476270	491	1985	110.5	533120	560	2220
	3 Rows	8160 6120 5060	● 1150 860 * 710	2 1 ½	5 lbs. Steam Pressure—227°F			1960 1595 1395	125 lbs. Steam Pressure—320°F			2805 2280 1990
					81.5	470450	485	1960	106.5	673180	753	2805
					86.5	384150	395	1595	113.5	547130	612	2280
	4 Rows	8120 6100 5040	● 1150 860 * 710	2 1 ½	25 lbs. Steam Pressure—267°F			3020 2470 2130	125 lbs. Steam Pressure—353°F			3695 3010 2600
					100	624000	650	3020	134	887100	1022	3695
					106	508500	530	2470	145	723910	834	3010
	3 Rows	8160 6120 5060	● 1150 860 * 710	2 1 ½	75 lbs. Steam Pressure—320°F			2980 2425 2115	125 lbs. Steam Pressure—353°F			3695 3010 2600
					110	438720	457	1825	150.5	624960	720	2600
					85.5	503040	524	2095	112	715230	824	2980
0° F.	4 Rows	8120 6100 5040	● 1150 860 * 710	2 1 ½	0 lbs. Steam Pressure—212°F			2890 2360 2040	10 lbs. Steam Pressure—240°F			3110 2535 2200
					74	693550	715	2890	80.5	747320	785	3110
					81	565510	583	2360	88.5	609250	640	2535
	3 Rows	8160 6120 5060	● 1150 860 * 710	2 1 ½	5 lbs. Steam Pressure—227°F			2340 1905 1655	125 lbs. Steam Pressure—353°F			3090 2510 2180
					59	562600	580	2340	81.5	742000	830	3090
					63	456870	471	1905	88	603450	675	2510
	4 Rows	8120 6100 5040	● 1150 860 * 710	2 1 ½	25 lbs. Steam Pressure—267°F			2740 2235 1945	125 lbs. Steam Pressure—353°F			3240 2635 2285
					67.5	397700	410	1655	92.5	523880	586	2180
					77.5	727680	758	3030	107.5	956540	1102	3980
	3 Rows	8160 6120 5060	● 1150 860 * 710	2 1 ½	75 lbs. Steam Pressure—320°F			2460 2000 1740	125 lbs. Steam Pressure—353°F			3240 2635 2285
					86	593280	618	2470	118	781200	900	3255
					90	513600	535	2140	125.5	684850	789	2855

1. C. F. M.—The cubic feet of air per minute ratings in the above tables represent the total quantity of air handled by the fans and delivered thru the nozzles at the final temperatures.
2. R. P. M.—Units running at a speed of 1150 and 860 revolutions per minute are powered by 60 cycle alternating current or direct current motors.
*Units running at a speed of 710 revolutions per minute are powered by 25 or 50 cycle alternating current or direct current motors.
The speeds shown represent the full load R. P. M. of commercial motors having the corresponding current characteristics as noted above. The standard motors are designed to operate on 110, 220, 440 or 550 volts, Direct Current or single phase, 2 phase, or 3 phase Alternating Current.
●The 1150 R. P. M. units should not be used on installations where practically silent operation is required.
3. STEAM PRESSURE—Final temperatures, B. T. U. per hour, condensation in pounds per hour, and equivalent square feet of cast iron direct radiation, are based on dry and saturated steam being supplied to the heating element inlet at the gauge pressures shown.
4. EQUIVALENT RADIATION—The equivalent square feet of direct cast iron column type radiation is based upon the heat emission of 240 B. T. U. per hour per square foot of direct radiation.
5. FINAL TEMPERATURE—The temperature of the air at the discharge for ordinary heating jobs, should be limited to the range between 75° and 160°F.
6. TRAPS—Unit heaters using copper fin heating elements, such as used in the above heaters, require high capacity continuous flow traps to take care of the heavy initial condensation and to provide the necessary continuous draining of the heater to prevent freezing of the tubes when the temperature of the entering air is below 32°F. The B. & B. No. 0 Blast trap is designed especially for this service, and its use on the above heaters is highly recommended.

Dimensions Massachusetts Type "V" Unit Heater 30-inch Model FOR FLOOR MOUNTING



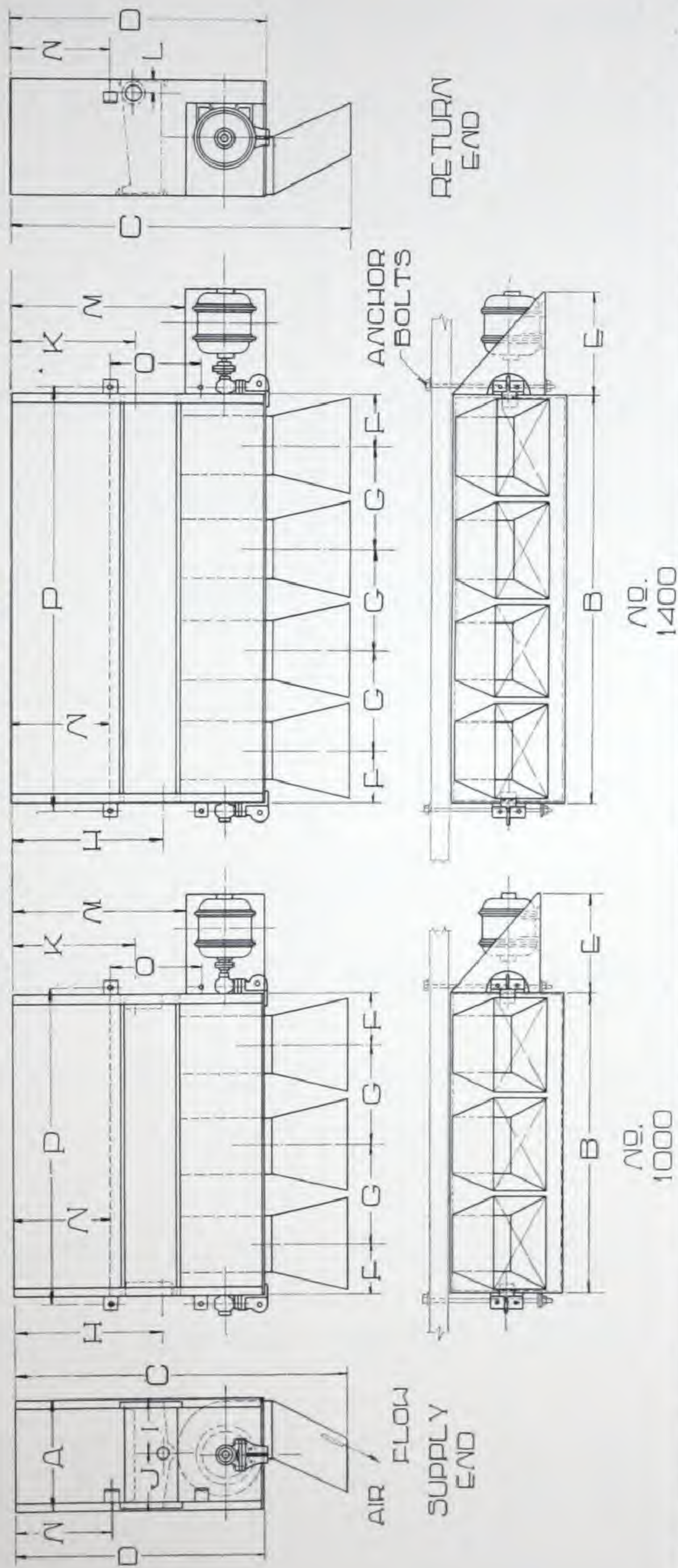
Unit No.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Size of Tappings		Floor Space Sq. Ft.	Size Outlet Cowl	Total Ship'g Weight
1000	30 3/8	80 1/2	111	84	26 1/8	13 3/8	26 3/4	52 1/4	14 5/8	15 3/8	43 1/2	2 3/4	66 1/8	30	24	77 1/2	3	3	14.0	11x20 1/2	1780
1400	30 3/8	107 1/2	111	84	27 1/8	13 1/2	26 1/2	52 1/4	14 5/8	15 3/8	43 1/2	2 3/4	65 1/8	30	24	104 3/4	3	3	22.7	11x20 1/2	2000

Heating Sections :

		3 Row		4 Row	
No. 1000	No. 1400	280 Linear feet Tubing	384 Linear feet Tubing	378 Linear feet Tubing	518 Linear feet Tubing
		Fan Wheels:			
		No. 1000		3-12 1/2" diameter S. C. Fans	
		No. 1400		4-12 1/2" diameter S. C. Fans	

Dimensions Massachusetts Type "C" Unit Heater 30-inch Model

FOR CEILING SUSPENSION



Unit No.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Size of Tappings Steam	Drip	Ceiling Space Sq. Ft.	Size Outlet Cowl	Total Shipping Weight
1000	30	80 1/2	94 1/2	72	26 1/8	13 3/8	26 3/4	41 5/8	14 5/8	15 3/8	34 5/8	23 4/8	51	30	20	84 1/2	3	3	53	14 1/2 x 25	1730
1400	30	107 1/2	94 1/2	72	27 1/8	13 3/8	26 1/8	41 5/8	14 5/8	15 3/8	34 5/8	23 4/8	51	30	20	111 1/2	3	3	70	14 1/2 x 25	1950

Hearing Sections :

3 Row		4 Row	
No. 1000	280 Lineal feet Tubing	No. 1000	3-12 1/2" diameter S. C. Fans
No. 1400	384 Lineal feet Tubing	No. 1400	4-12 1/2" diameter S. C. Fans

No. 1000 MASSACHUSETTS TYPE "V" & "C" UNIT HEATERS

Enter- ing Air Temp.	HEATER	C. F. M.	R. P. M.	H. P.	Final Temp. °F.	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. °F.	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.
70 °F.	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	0 lbs. Steam Pressure—212 °F.							
					126.5	659600	680	2740	137	771120	810	3210
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	130	578120	596	2410	142	686390	721	2860
					131	572300	590	2385	143	667350	701	2780
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	115	533500	550	2220	123	623560	655	2595
					118	465600	480	1940	126.5	543590	571	2260
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	119	460750	475	1920	127.5	537880	565	2240
					123.5	502080	523	2090	135.5	607380	651	2530
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	5 lbs. Steam Pressure—227 °F.							
					132	720000	750	3000	146	871420	934	3630
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	136.5	631680	658	2630	151	764130	819	3180
					139.5	624000	650	2600	152	754800	809	3140
60 °F.	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	119.5	581760	606	2420	130.5	704420	755	2930
					122.5	507840	529	2115	134.5	614850	659	2555
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	123.5	502080	523	2090	135.5	607380	651	2530
					127.5	543590	571	2260	141.5	777780	870	3240
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	10 lbs. Steam Pressure—240 °F.							
					120	712950	735	2970	130	823480	865	3430
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	124.5	627590	647	2615	135	724470	761	3015
					125.5	619830	639	2580	136	716860	753	2985
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	108	578120	596	2405	116	668300	702	2780
					111	504400	520	2100	119.5	583580	613	2430
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	112	499550	515	2080	120.5	576910	606	2405
					120.5	541440	564	2260	128.5	646570	693	2695
50 °F.	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	5 lbs. Steam Pressure—227 °F.							
					125.5	772800	805	3215	139	923070	990	3845
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	130	680640	709	2835	145	812640	871	3385
					131	672000	700	2800	146	802380	860	3340
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	112.5	626880	653	2610	123.5	749200	803	3120
					115.5	547200	570	2280	127.5	653100	700	2720
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	116.5	541440	564	2260	128.5	646570	693	2695
					128.5	646570	693	2695	139	923070	990	3845
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	10 lbs. Steam Pressure—240 °F.							
					114	768240	792	3205	124	876790	921	3650
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	118.5	676090	697	2820	129.5	772070	811	3215
					119.5	664450	685	2770	130.5	759700	798	3160
50 °F.	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	101	622740	642	2595	108	711140	747	2965
					104.5	544170	561	2265	113.5	620700	652	2585
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	105.5	538350	555	2240	114.5	614990	646	2560
					128.5	646570	693	2695	139	923070	990	3845
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	10 lbs. Steam Pressure—240 °F.							
					114	768240	792	3205	124	876790	921	3650
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	118.5	676090	697	2820	129.5	772070	811	3215
					119.5	664450	685	2770	130.5	759700	798	3160
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	101	622740	642	2595	108	711140	747	2965
					104.5	544170	561	2265	113.5	620700	652	2585
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	105.5	538350	555	2240	114.5	614990	646	2560
					128.5	646570	693	2695	139	923070	990	3845

No. 1000 Massachusetts Type "V" & "C" Unit Heaters—Continued

Enter- ing Air Temp.	HEATER Number of tubes deep	C. F. M.	R. P. M.	H. P.	Final Temp. °F.	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.	Final Temp. °F.	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad. sq. ft.
30 °F.					0 lbs. Steam Pressure—212 °F.				10 lbs. Steam Pressure—240 °F.			
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	101 106 107	881730 774060 758540	909 798 782	3675 3220 3155	110 116 117	983420 862510 846330	1033 906 889	4100 3595 3525
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	87 90.5 91.5	713920 624680 616920	736 644 636	2970 2600 2570	94 97.5 98.5	706820 696860 689250	837 732 724	3320 2900 2870
					5 lbs. Steam Pressure—227 °F.				25 lbs. Steam Pressure—267 °F.			
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	106 112 113	940800 825600 809280	980 860 843	3920 3440 3370	119.5 126.5 127.5	1088810 954460 934870	1167 1023 1002	4530 3975 3890
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	91 95 96	761280 666240 658560	793 694 686	3170 2775 2740	101.5 106 107	880750 769730 761330	944 825 816	3670 3200 3170
					0 lbs. Steam Pressure—212 °F.				10 lbs. Steam Pressure—240 °F.			
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	82 87.5 88.5	1051480 925380 905980	1084 954 934	4385 3850 3775	88.5 95.5 96.5	1132880 997700 974850	1190 1048 1024	4725 4150 4055
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	65 69.5 70.5	853000 747870 741080	880 771 764	3550 3115 3085	70.5 76 77	918680 806340 798730	965 847 839	3825 3360 3325
					5 lbs. Steam Pressure—227 °F.				25 lbs. Steam Pressure—267 °F.			
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	86.5 92.5 93.5	1104000 970560 950400	1150 1011 990	4600 4045 3960	98 105.5 106.5	1235290 1086950 1063620	1324 1165 1140	5150 4525 4440
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	68 73 74	895680 785280 777600	933 818 810	3730 3270 3240	78 83 84	1000180 877950 859560	1072 941 932	4175 3655 3575
0 °F.					75 lbs. Steam Pressure—320 °F.				125 lbs. Steam Pressure—353 °F.			
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	112 120.5 121.5	1387490 1222100 1196170	1552 1367 1338	5775 5100 4985	112 120.5 121.5	1387490 1222100 1196170	1552 1367 1338	5775 5100 4985
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	88.5 94.5 95.5	1126440 986080 977140	1260 1103 1093	4695 4105 4045	88.5 94.5 95.5	1126440 986080 977140	1260 1103 1093	4695 4105 4045
					75 lbs. Steam Pressure—320 °F.				125 lbs. Steam Pressure—353 °F.			
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	144 153 154	1338460 1175270 1151840	1542 1354 1327	5570 4900 4800	144 153 154	1338460 1175270 1151840	1542 1354 1327	5570 4900 4800
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	120 126 127	1084130 947860 937440	1249 1092 1080	4515 3950 3905	120 126 127	1084130 947860 937440	1249 1092 1080	4515 3950 3905
					75 lbs. Steam Pressure—320 °F.				125 lbs. Steam Pressure—353 °F.			
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	112 120.5 121.5	1387490 1222100 1196170	1552 1367 1338	5775 5100 4985	112 120.5 121.5	1387490 1222100 1196170	1552 1367 1338	5775 5100 4985
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	88.5 94.5 95.5	1126440 986080 977140	1260 1103 1093	4695 4105 4045	88.5 94.5 95.5	1126440 986080 977140	1260 1103 1093	4695 4105 4045
					75 lbs. Steam Pressure—320 °F.				125 lbs. Steam Pressure—353 °F.			
	4 Rows	11200 9250 9000	860 *710 690	3 2 1½	118.5 127.5 128.5	1449560 1275960 1249920	1670 1470 1440	6040 5310 5200	118.5 127.5 128.5	1449560 1275960 1249920	1670 1470 1440	6040 5310 5200
	3 Rows	11230 9270 9020	860 *710 690	3 2 1½	93.5 100 101	1178740 1032920 1023370	1358 1190 1179	4900 4300 4260	93.5 100 101	1178740 1032920 1023370	1358 1190 1179	4900 4300 4260

1. C. F. M.—The cubic feet of air per minute ratings in the above tables represent the total quantity of air handled by the fans and delivered thru the nozzles at the final temperatures.

2. R. P. M.—Units running at a speed of 860 and 690 revolutions per minute are powered by 60 cycle alternating current or direct current motors.

*Units running at a speed of 710 revolutions per minute are powered by 25 or 50 cycle alternating current or direct current motors.

The speeds shown represent the full load R. P. M. of commercial motors having the corresponding current characteristics as noted above. The standard motors are designed to operate on 110, 220, 440 or 550 volts, direct current or single phase, 2 phase, or 3 phase alternating current.

3. STEAM PRESSURE—Final temperatures, B. T. U. per hour, condensation in pounds per hour, and equivalent square feet of cast iron direct radiation,

are based on dry and saturated steam being supplied to the heating element inlet at the gauge pressures shown.

4. EQUIVALENT RADIATION—The equivalent square feet of direct cast iron column type radiation is based upon the heat emission of 240 B. T. U. per hour per square foot of direct radiation.

5. FINAL TEMPERATURE—The temperature of the air at the discharge for ordinary heating jobs, should be limited to the range between 75 ° and 160 ° F.

6. TRAPS—Unit heaters using copper fin heating elements, such as used in the above heaters, require high capacity continuous flow traps to take care of the heavy initial condensation and to provide the necessary continuous draining of the heater to prevent freezing of the tubes when the temperature of the entering air is below 32 ° F. The B. & B. No. 0 Blast trap is designed especially for this service, and its use on the above heaters is highly recommended.

No. 1400 MASSACHUSETTS TYPE "V" & "C" UNIT HEATERS

Enter- ing Air Temp.	HEATER Number of tubes deep	C. F. M.	R. F. M.	H. P.	0 lbs. Steam Pressure—212°F.			10 lbs. Steam Pressure—240°F.			75 lbs. Steam Pressure—320°F.		
					Final Temp. °F.	B. T. U. per hour	Conden- sation lbs. per hour	Equip. Rad. sq. ft.	Final Temp. °F.	B. T. U. per hour	Conden- sation lbs. per hour	Equip. Rad. sq. ft.	Final Temp. °F.
70°F.	4 Rows	14900	860	5	127	881730	909	3670	137	1028160	1080	4285	162.5
		12300	*710	3	131	784730	809	3270	142	915820	962	3815	169.5
		12000	690	2	131.5	761450	785	3170	143	890120	935	3705	170.5
	3 Rows	14940	860	5	115.5	711980	734	2970	123	831100	873	3460	143.5
		12340	*710	3	118.5	621770	641	2595	126.5	725420	762	3015	148
		12040	690	2	119	614010	633	2560	127.5	717810	754	2985	149
	4 Rows	14900	860	5	132	960000	1000	4000	146	1162520	1246	4845	171
		12300	*710	3	137.5	855360	891	3565	151	1017910	1091	4245	178.5
		12000	690	2	138	830400	865	3460	152	1006710	1079	4190	179.5
	3 Rows	14940	860	5	120	775680	808	3230	130.5	938600	1006	3905	150.5
		12340	*710	3	122.5	676800	705	2820	134	820110	879	3405	155.5
		12040	690	2	123	670080	698	2790	135.5	810780	869	3375	156.5
60°F.	4 Rows	14900	860	5	120.5	950600	980	3960	130	1097660	1153	4575	156
		12300	*710	3	125	836140	862	3480	135	966280	1015	4010	163.5
		12000	690	2	125.5	825470	851	3440	136	954860	1003	3980	164.5
	3 Rows	14940	860	5	108.5	771130	795	3210	116	893020	937	3705	136
		12340	*710	3	111.5	673180	694	2800	119.5	777780	817	3240	141.5
		12040	690	2	112	665420	686	2770	120.5	770170	809	3210	142.5
	4 Rows	14900	860	5	126	1029120	1072	4295	139	1232490	1321	5130	165
		12300	*710	3	130.5	905280	943	3770	145	1083210	1161	4510	173.5
		12000	690	2	131	890640	934	3730	146	1071080	1148	4455	174.5
	3 Rows	14940	860	5	113	836190	871	3480	123.5	998310	1070	4160	144.5
		12340	*710	3	116	729600	760	3040	127.5	871420	934	3625	148.5
		12040	690	2	116.5	720960	751	3000	128.5	863030	925	3590	149.5
50°F.	4 Rows	14900	860	5	114.5	1025290	1057	4270	124	1170960	1230	4865	150
		12300	*710	3	119.5	902100	930	3755	129.5	1029110	1081	4290	158
		12000	690	2	120	887550	915	3700	130.5	1011980	1063	4210	159
	3 Rows	14940	860	5	102	830320	856	3460	108	948190	996	3955	129.5
		12340	*710	3	105	725560	748	3020	113.5	828240	870	3450	135
		12040	690	2	105.5	717800	740	2990	114.5	819670	861	3415	136
	4 Rows	14900	860	5	114.5	1025290	1057	4270	124	1170960	1230	4865	150
		12300	*710	3	119.5	902100	930	3755	129.5	1029110	1081	4290	158
		12000	690	2	120	887550	915	3700	130.5	1011980	1063	4210	159
	3 Rows	14940	860	5	102	830320	856	3460	108	948190	996	3955	129.5
		12340	*710	3	105	725560	748	3020	113.5	828240	870	3450	135
		12040	690	2	105.5	717800	740	2990	114.5	819670	861	3415	136
50°F.	4 Rows	14900	860	5	119.5	1104960	1151	4600	133	1309000	1403	5445	159
		12300	*710	3	125	972480	1013	4050	139	1150390	1233	4795	167.5
		12000	690	2	125.5	957120	997	3990	140	1131730	1213	4720	168.5
	3 Rows	14940	860	5	106	895680	933	3730	116.5	1061750	1138	4420	135.5
		12340	*710	3	109.5	783360	816	3260	120.5	925540	992	3855	140.5
		12040	690	2	110	775680	808	3230	121.5	916210	982	3820	141.5
	4 Rows	14900	860	5	119.5	1104960	1151	4600	133	1309000	1403	5445	159
		12300	*710	3	125	972480	1013	4050	139	1150390	1233	4795	167.5
		12000	690	2	125.5	957120	997	3990	140	1131730	1213	4720	168.5
	3 Rows	14940	860	5	106	895680	933	3730	116.5	1061750	1138	4420	135.5
		12340	*710	3	109.5	783360	816	3260	120.5	925540	992	3855	140.5
		12040	690	2	110	775680	808	3230	121.5	916210	982	3820	141.5

No. 1400 Massachusetts Type "V" & "C" Unit Heaters—Continued

Enter- ing Air Temp.	HEATER Number of tubes deep	C. F. M.	R. P. M.	H. P.	Final Temp., °F.	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad., sq. ft.	Final Temp., °F.	B. T. U. per hour	Conden- sation lbs. per hour	Equiv. Rad., sq. ft.
<p>The No. 1400 Unit Heaters are not to be used on in- stallations where the steam pressure will be less than 10 lbs. per square inch at entering air temperature</p>												
30 °F.	4 Rows	14900	860	5	110	1312810	1379	5465	10 lbs. Steam Pressure—240 °F.			
		12300	*710	3		1150970	1209	4795	75 lbs. Steam Pressure—320 °F.			
		1200	690	2		1128120	1185	4700	125 lbs. Steam Pressure—353 °F.			
	3 Rows	14940	860	5	94	1063380	1117	4430	10 lbs. Steam Pressure—240 °F.			
		12340	*710	3	97.5	929150	976	3865	75 lbs. Steam Pressure—320 °F.			
		12040	690	2	98.5	919630	966	3825	125 lbs. Steam Pressure—353 °F.			
	4 Rows	14900	860	5	119.5	1451750	1556	6045	10 lbs. Steam Pressure—240 °F.			
		12300	*710	3	126.5	1274480	1366	5300	75 lbs. Steam Pressure—320 °F.			
		1200	690	2	127.5	1250220	1340	3855	125 lbs. Steam Pressure—353 °F.			
	3 Rows	14940	850	5	101.5	1175580	1260	4895	10 lbs. Steam Pressure—240 °F.			
		12340	*710	3	106	1026300	1100	4260	75 lbs. Steam Pressure—320 °F.			
		12040	690	2	107	1016040	1089	4230	125 lbs. Steam Pressure—353 °F.			
0 °F.	4 Rows	14900	860	5	88.5	1511780	1588	6300	10 lbs. Steam Pressure—240 °F.			
		12300	*710	3	95.5	1331850	1399	5540	75 lbs. Steam Pressure—320 °F.			
		1200	690	2	96.5	1302340	1368	5405	125 lbs. Steam Pressure—353 °F.			
	3 Rows	14940	860	5	70.5	1226180	1288	5100	10 lbs. Steam Pressure—240 °F.			
		12340	*710	3	76	1075760	1130	4490	75 lbs. Steam Pressure—320 °F.			
		12040	690	2	77	1066240	1120	4440	125 lbs. Steam Pressure—353 °F.			
	4 Rows	14900	860	5	98	1649540	1768	6865	10 lbs. Steam Pressure—240 °F.			
		12300	*710	3	105.5	1449880	1554	6040	75 lbs. Steam Pressure—320 °F.			
		1200	690	2	106.5	1418160	1520	5920	125 lbs. Steam Pressure—353 °F.			
	3 Rows	14940	860	5	78	1336060	1432	5565	10 lbs. Steam Pressure—240 °F.			
		12340	*710	3	83	1171850	1256	4870	75 lbs. Steam Pressure—320 °F.			
		12040	690	2	84	1159720	1243	4760	125 lbs. Steam Pressure—353 °F.			

1. C. F. M.—The cubic feet of air per minute ratings in the above tables represent the total quantity of air handled by the fans and delivered thru the nozzles at the final temperatures.

2. R. P. M.—Units running at a speed of 860 and 690 revolutions per minute are powered by 60 cycle alternating current or direct current motors.

*Units running at a speed of 710 revolutions per minute are powered by 25 or 50 cycle alternating current or direct current motors.

The speeds shown represent the full load R. P. M. of commercial motors having the corresponding current characteristics as noted above. The standard motors are designed to operate on 110, 220, 440 or 550 volts, direct current or single phase, 2 phase, or 3 phase alternating current.

3. STEAM PRESSURE—Final temperatures, B. T. U. per hour, condensation in pounds per hour, and equivalent square feet of cast iron direct radiation,

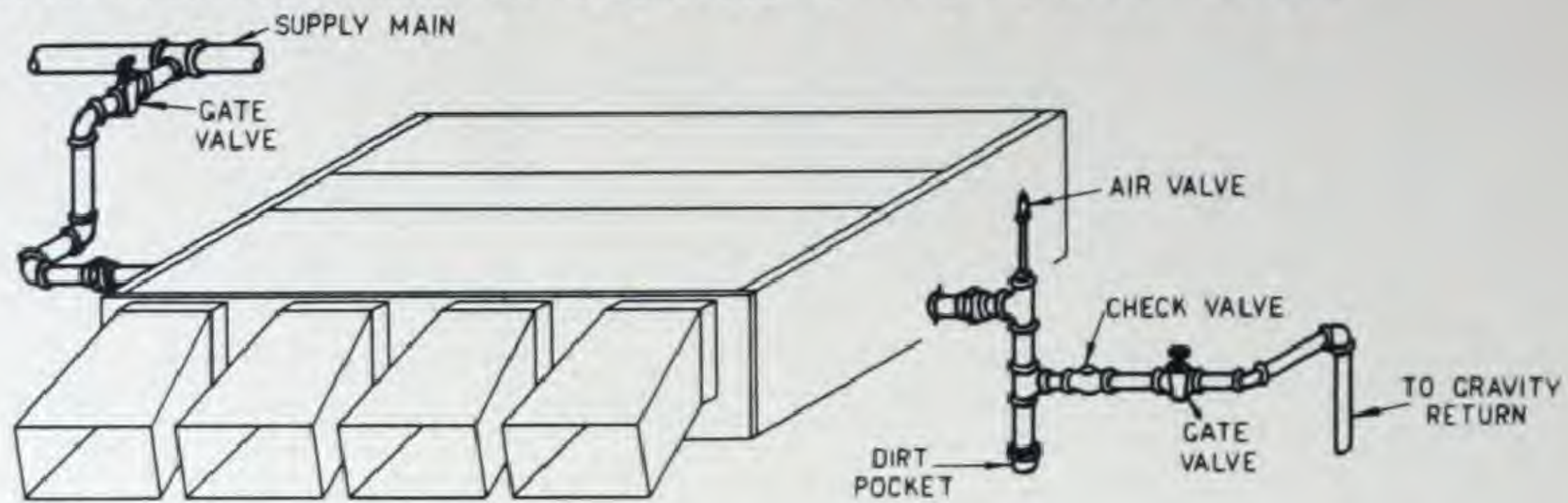
are based on dry and saturated steam being supplied to the heating element inlet at the gauge pressures shown.

4. EQUIVALENT RADIATION—The equivalent square feet of direct cast iron column type radiation is based upon the heat emission of 240 B. T. U. per hour per square foot of direct radiation.

5. FINAL TEMPERATURE—The temperature of the air at the discharge for ordinary heating jobs, should be limited to the range between 75° and 160° F.

6. TRAPS—Unit heaters using copper fin heating elements, such as used in the above heaters, require high capacity continuous flow traps to take care of the heavy initial condensation and to provide the necessary continuous draining of the heater to prevent freezing of the tubes when the temperature of the entering air is below 32° F. The B. & B. No. 0 Blast trap is designed especially for this service, and its use on the above heaters is highly recommended.

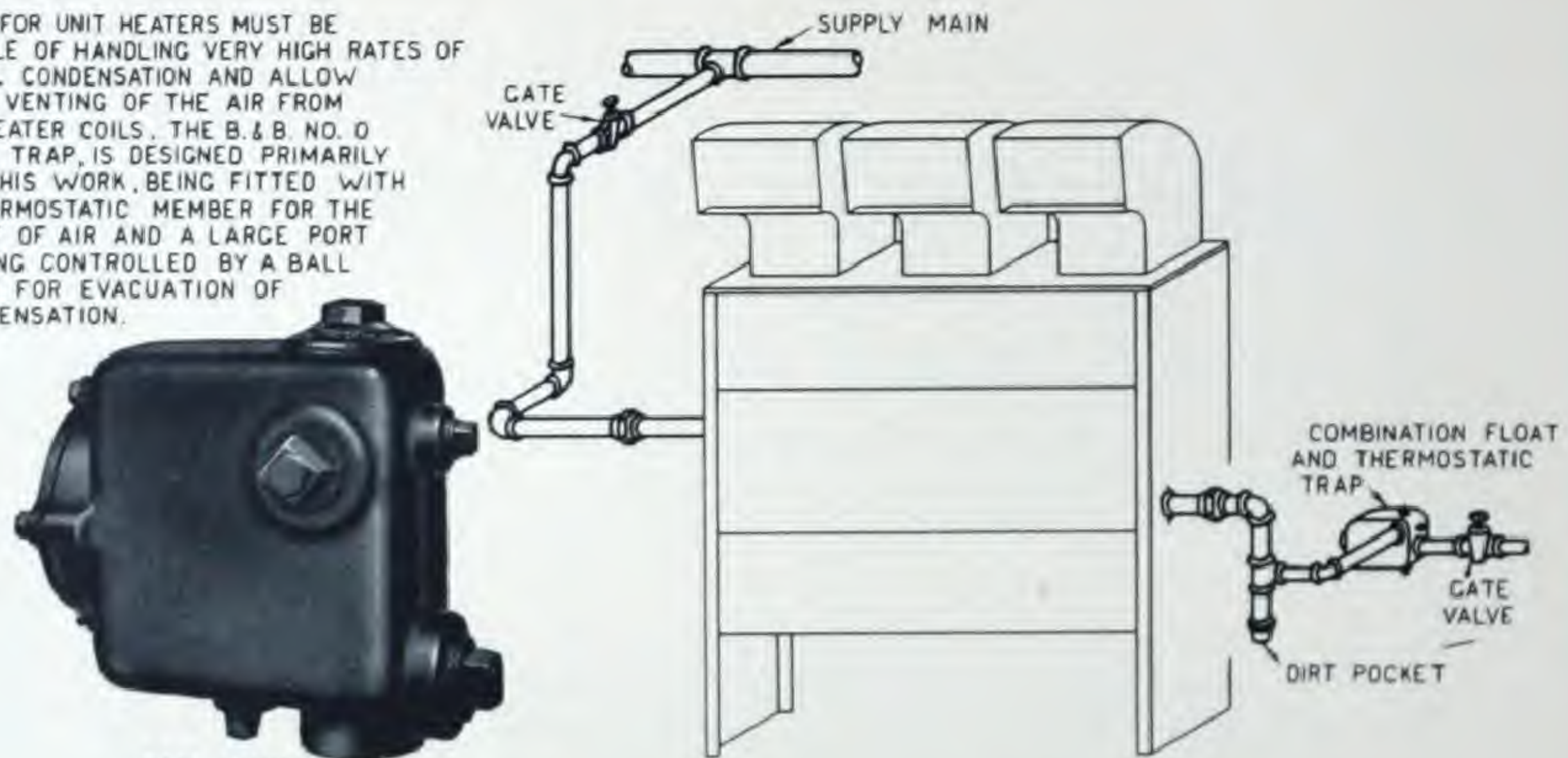
TYPICAL PIPING CONNECTIONS ON MASSACHUSETTS TYPE "V" & "C" UNIT HEATERS



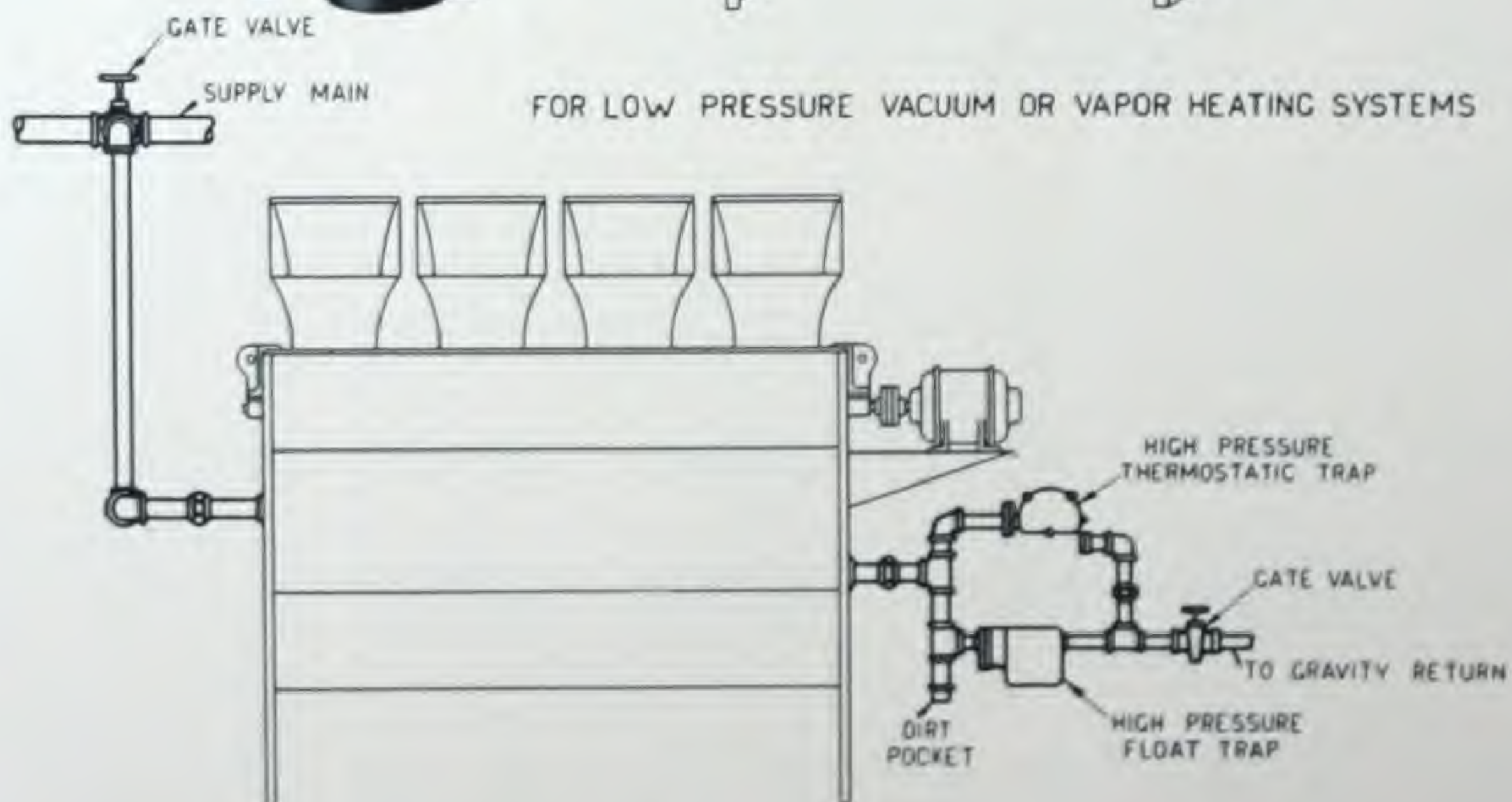
FOR LOW PRESSURE GRAVITY HEATING SYSTEM

NOTES

TRAPS FOR UNIT HEATERS MUST BE CAPABLE OF HANDLING VERY HIGH RATES OF INITIAL CONDENSATION AND ALLOW RAPID VENTING OF THE AIR FROM THE HEATER COILS. THE B. & B. NO. 0 BLAST TRAP, IS DESIGNED PRIMARILY FOR THIS WORK, BEING FITTED WITH A THERMOSTATIC MEMBER FOR THE RELIEF OF AIR AND A LARGE PORT OPENING CONTROLLED BY A BALL FLOAT FOR EVACUATION OF CONDENSATION.



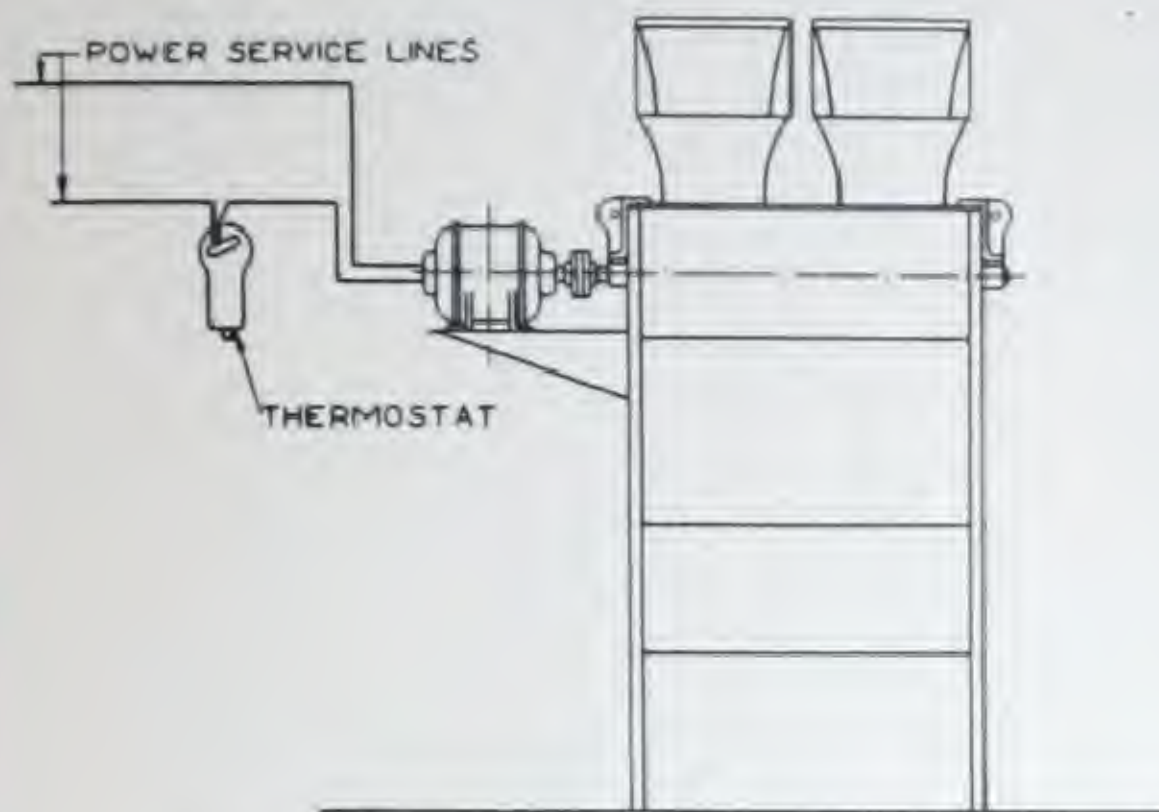
FOR LOW PRESSURE VACUUM OR VAPOR HEATING SYSTEMS



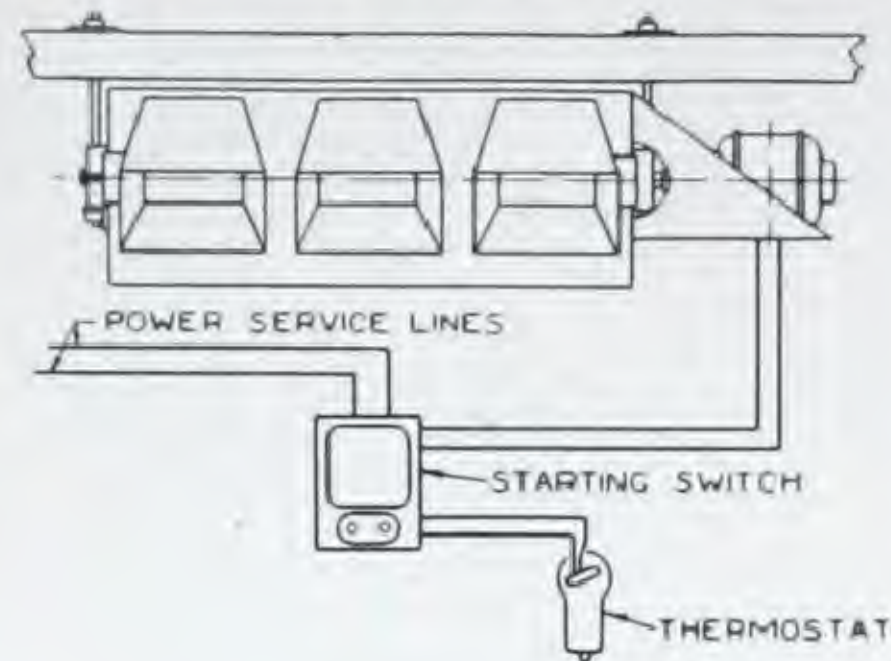
FOR HIGH PRESSURE HEATING SYSTEM

MASSACHUSETTS

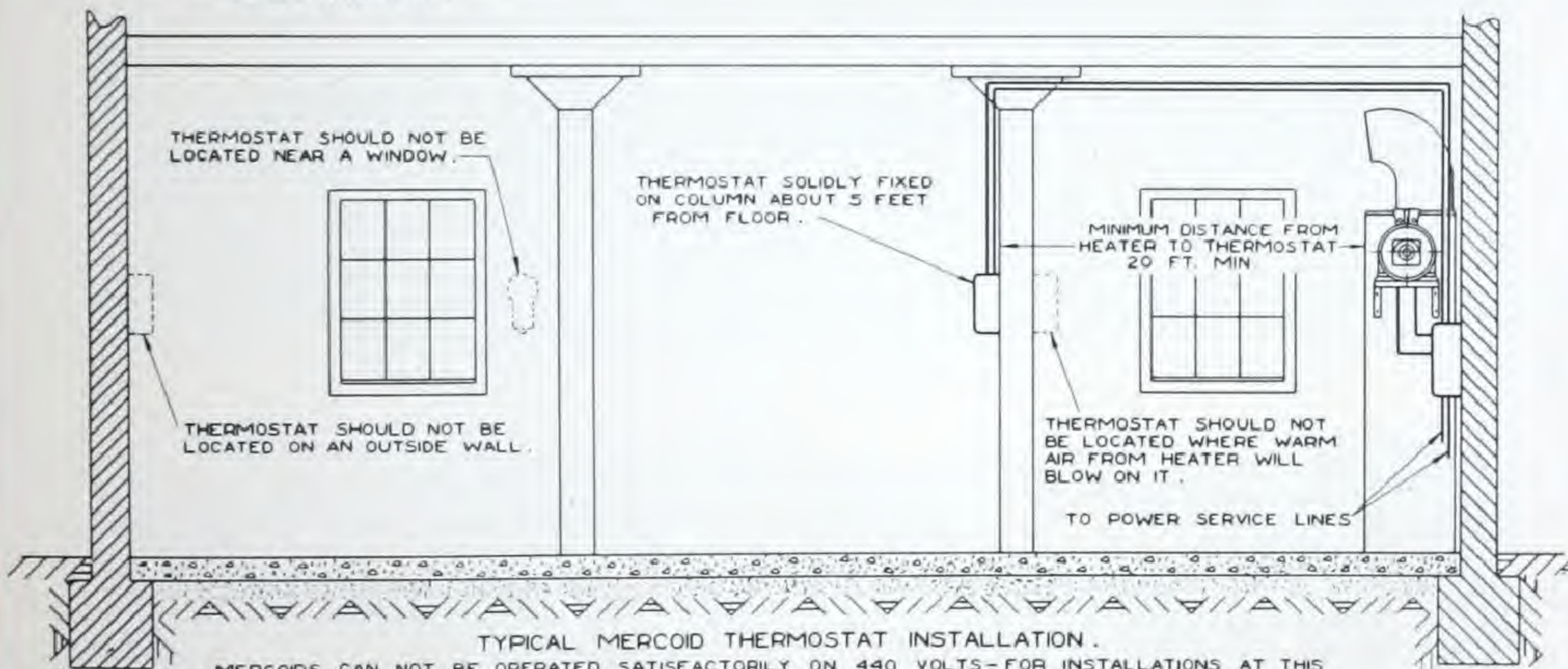
MERCOID CONTROLS USED IN CONNECTION WITH MASSACHUSETTS - TYPE "V" & "C" UNIT HEATERS



WIRING DIAGRAM FOR MOTORS LESS THAN ONE HORSE-POWER, SINGLE PHASE CURRENT.

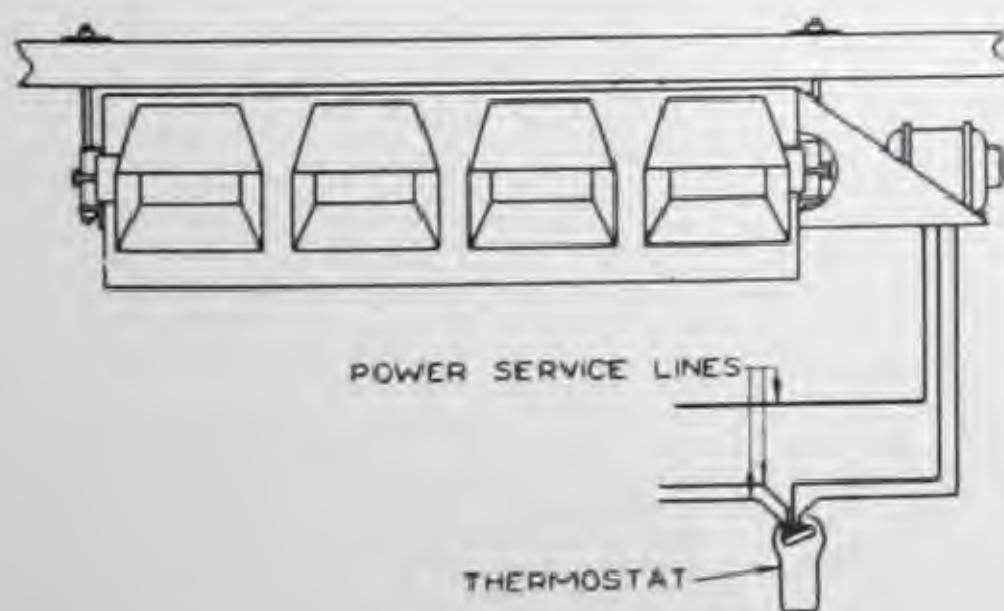


WIRING DIAGRAM FOR MOTORS OF ONE HORSE-POWER AND LARGER USING AUTOMATIC STARTING SWITCH SINGLE PHASE CURRENT.

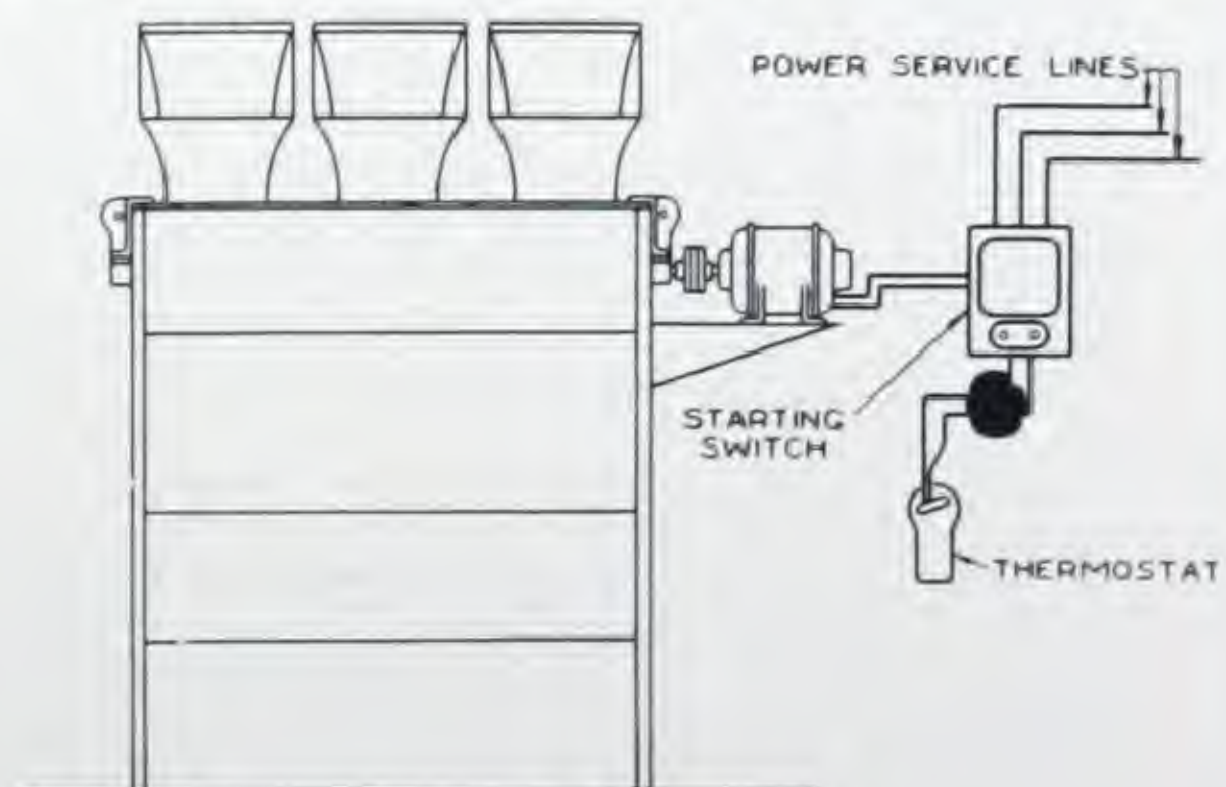


TYPICAL MERCOID THERMOSTAT INSTALLATION.

MERCOIDS CAN NOT BE OPERATED SATISFACTORILY ON 440 VOLTS - FOR INSTALLATIONS AT THIS VOLTAGE A SEPARATE 110 VOLT LIGHTING CIRCUIT LINE MAY BE USED TO CONNECT THE MERCOID AND THE STARTING SWITCH MAGNET, OR A TRANSFORMER MAY BE USED IN CONJUNCTION WITH THE STARTING SWITCH TO FURNISH 110 VOLTS FOR THE MERCOID. AUTOMATIC ACROSS THE LINE STARTING SWITCH NOT USED WHERE LOAD IS LESS THAN 10 AMPS 110 VOLTS OR 5 AMPS 220 VOLTS.



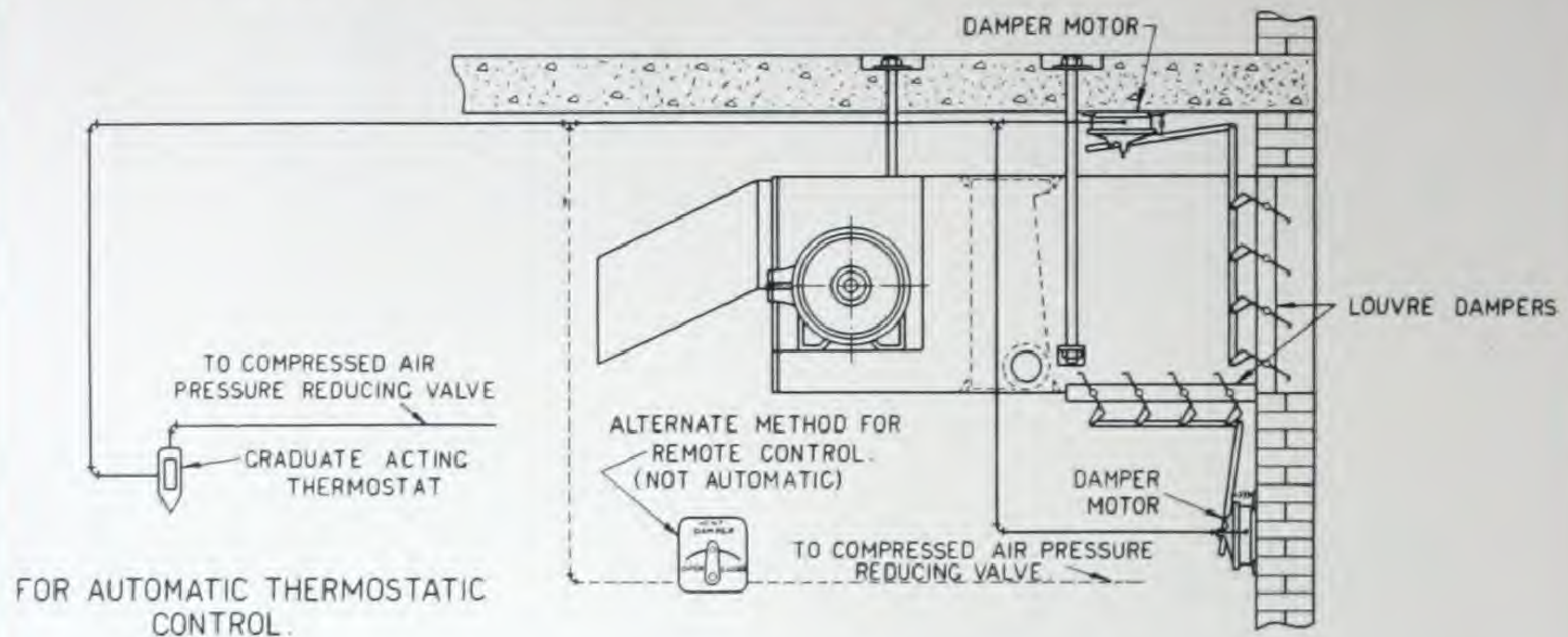
WIRING DIAGRAM FOR MOTORS LESS THAN ONE HORSE-POWER USING DOUBLE POLE THERMOSTAT ON THREE PHASE CURRENT.



WIRING DIAGRAM FOR MOTORS OF ONE HORSE-POWER AND LARGER USING SINGLE POLE THERMOSTAT ON THREE PHASE CURRENT.

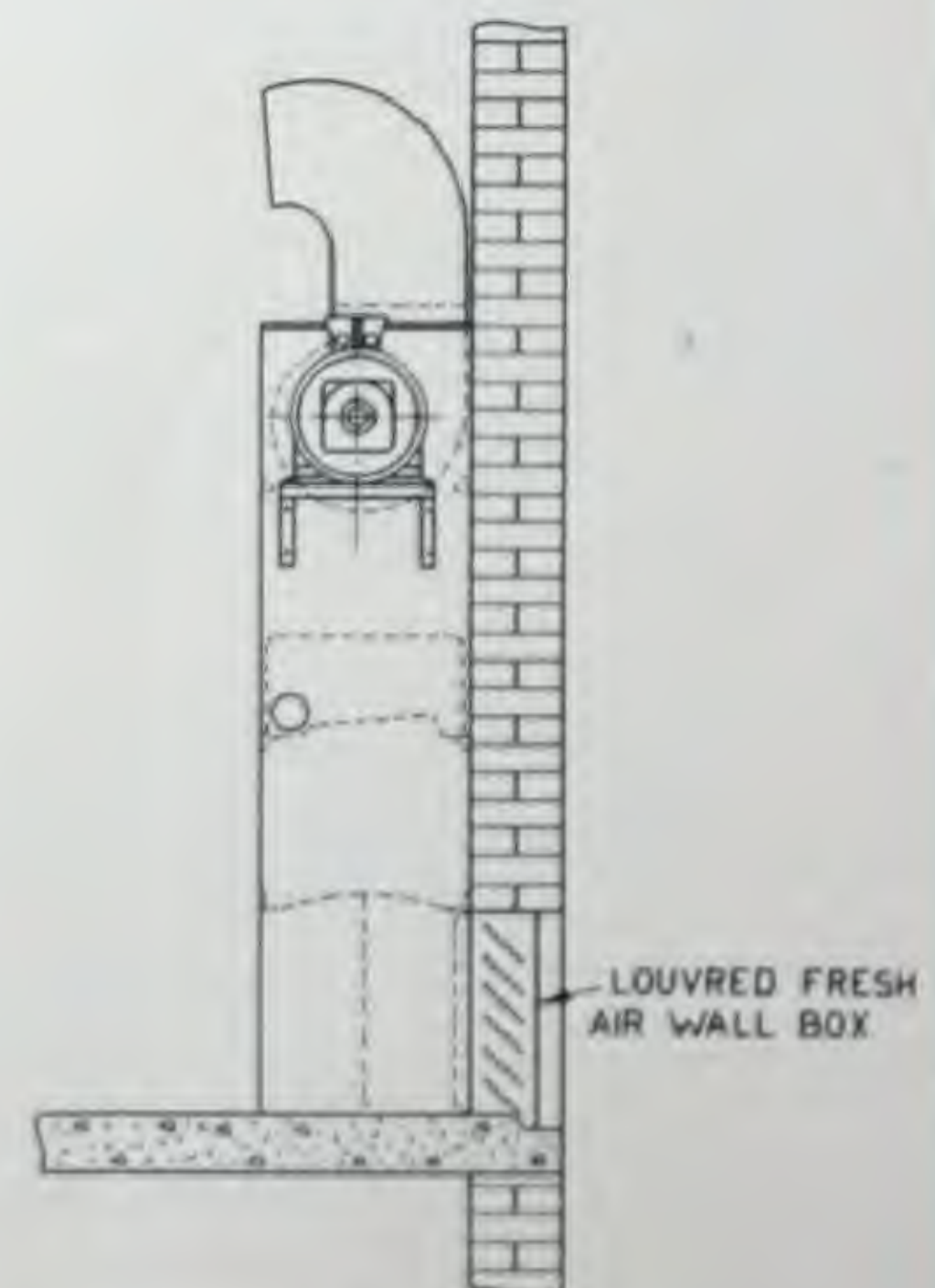
The B&B Line

SPECIAL APPLICATIONS OF MASSACHUSETTS TYPE "V" & "C" UNIT HEATERS



A technical cross-section diagram showing a 'V' unit heater mounted on a wall bracket. The heater is positioned against a brick wall. The bracket is a triangular support structure that is bolted to the wall and the heater's base. The heater unit itself has a rectangular body with a circular opening on its front face. Above the heater, a curved duct or pipe is shown, connected to the top of the unit. The entire assembly is shown in a vertical orientation, with the wall on the left and the heater extending to the right.

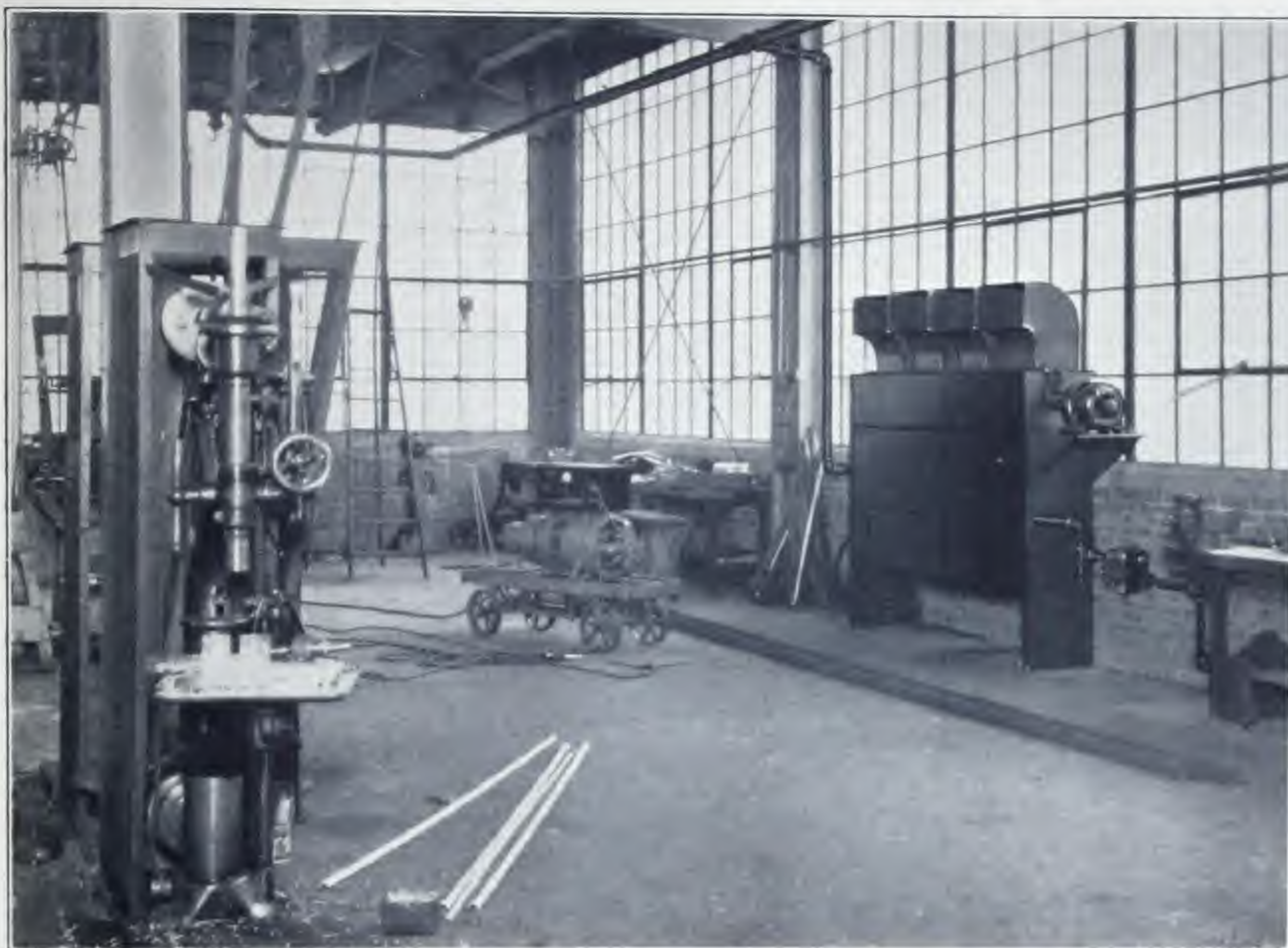
SPECIAL TYPE "V" UNIT HEATER
SUPPORTED ON WALL BRACKET



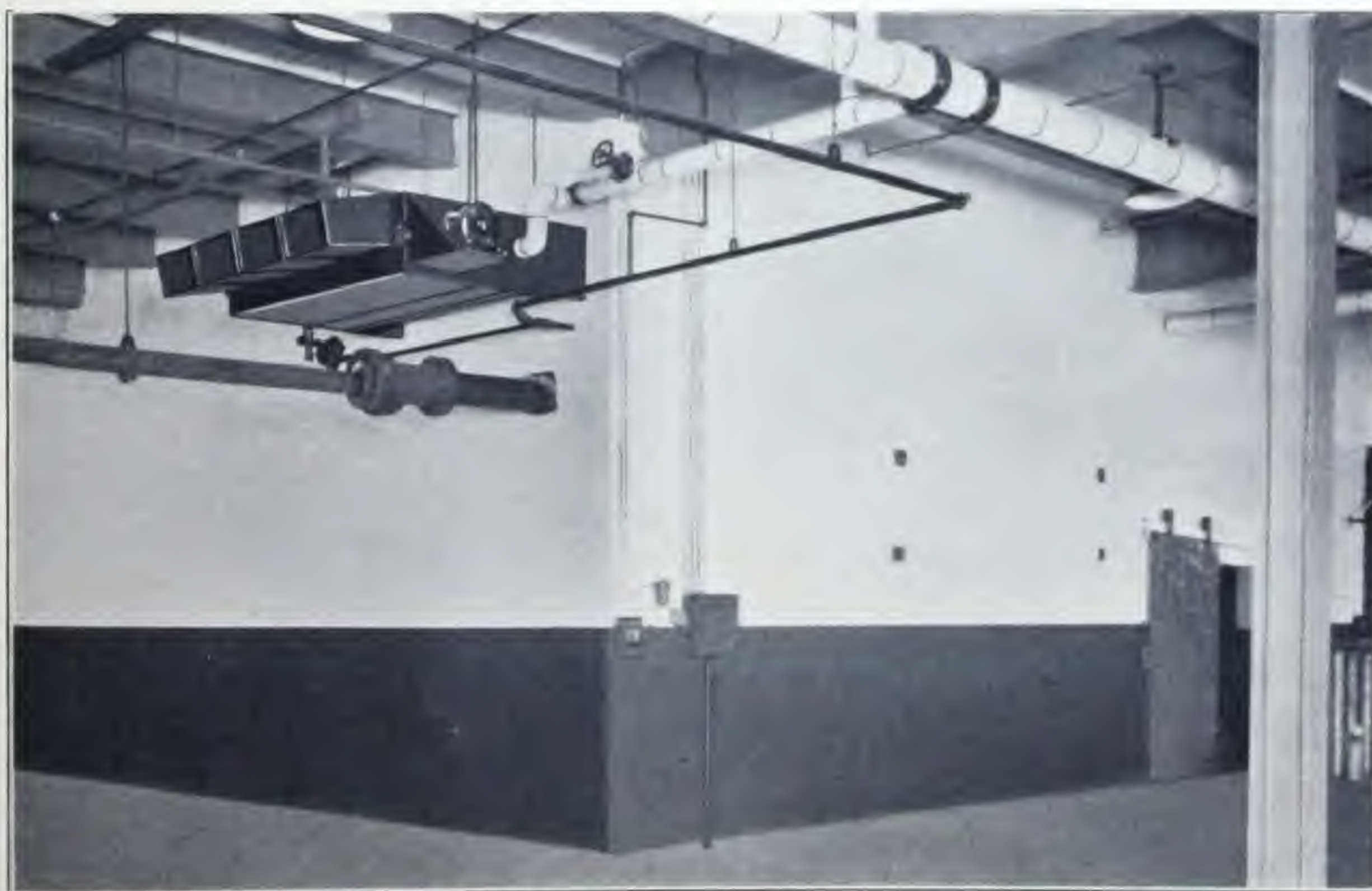
TYPE "V" UNIT HEATER ARRANGED
FOR PARTIAL OR TOTAL USE
OF FRESH AIR OR RECIRCULATION

20

MASSACHUSETTS



TYPICAL INSTALLATION MASSACHUSETTS TYPE "V" UNIT HEATER



TYPICAL INSTALLATION MASSACHUSETTS TYPE "C" UNIT HEATER

The B&B Line

MASSACHUSETTS



Portable Service Set



Massachusetts Modified Squirrel Cage Fan



Universal Type Fan



Type B Massachusetts Air Washer

The World's Most Complete Line

The Bishop & Babcock Line comprises Vacuum and Vapor low pressure Heating Specialties; a complete system of Automatic Temperature and Humidity Control; Massachusetts Squirrel Cage Fans, Air Washers and Unit Heaters.

Architects and Engineers who standardize on Bishop & Babcock apparatus insure uniformity in design and operation not to be found in equipment of varied manufacture.

THE BISHOP & BABCOCK SALES CO.
General Offices - - CLEVELAND, OHIO



Positive or Graduate Type Thermostat



B & B Compound Utilostat



All-Metal Duplex Thermostat



B & B Mixing Damper



B & B Multiflex Damper Motors



Air Compressor



B & B All-Metal Pneumatic Valves



B & B Multiflex Radiator Valves



B & B Alternating Receiver



B & B Special Multiflex Radiator Valves



B & B No. 1 Multiflex Trap



B & B No. 6 Multiflex Trap



B & B Bias Trap



B & B Drain and Suction Strainers



Steam

B & B
Steam
Regulators



Hot Water



B & B Vapor Damper Regulator

The B&B Line